

Sistemet Wireless Profesionale MikroTik

dhe CAPsMAN

Pershendetje!

Quhem: Erion DEMIRI

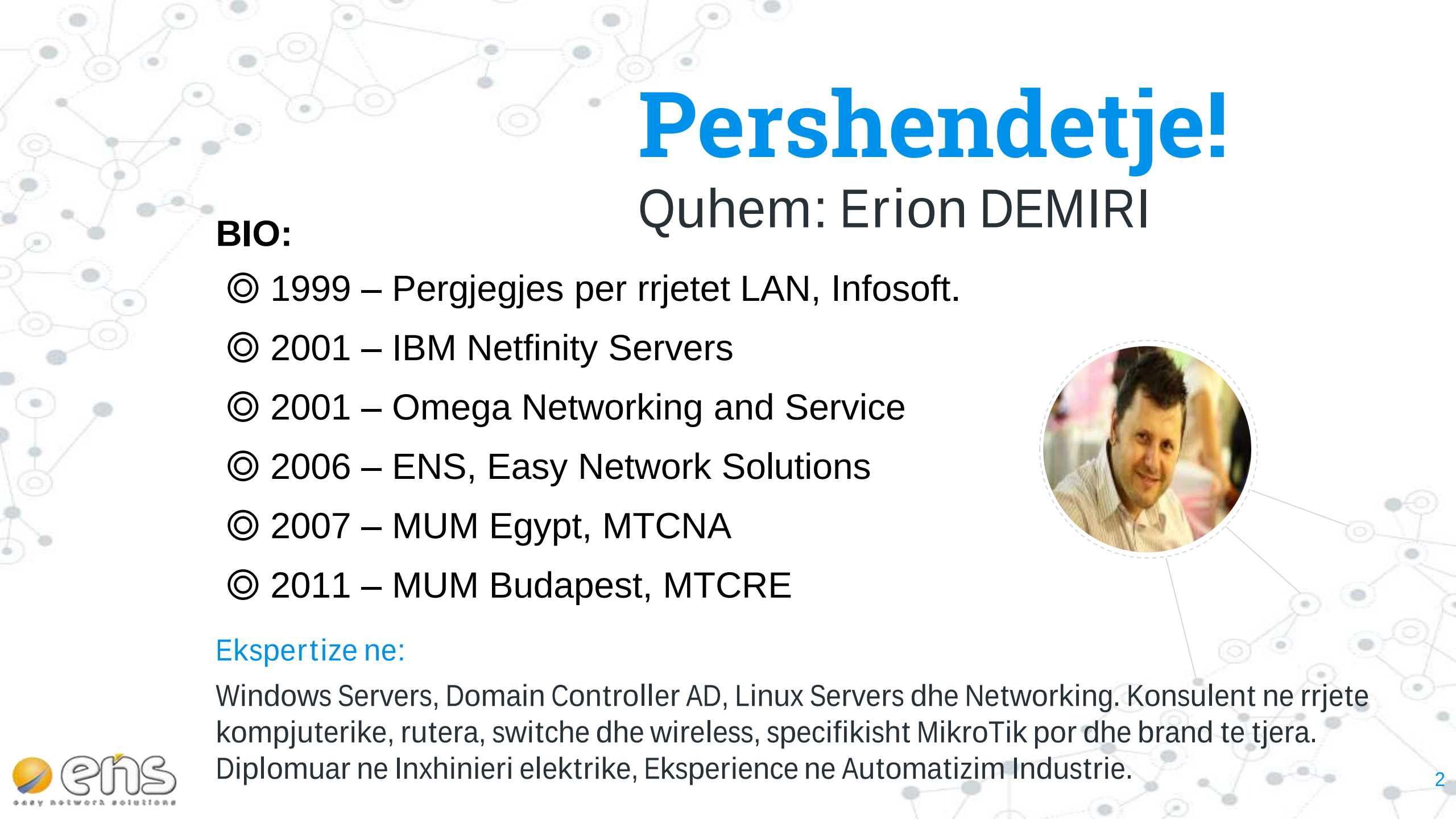
BIO:

- © 1999 – Pergjegjes per rrjetet LAN, Infosoft.
- © 2001 – IBM Netfinity Servers
- © 2001 – Omega Networking and Service
- © 2006 – ENS, Easy Network Solutions
- © 2007 – MUM Egypt, MTCNA
- © 2011 – MUM Budapest, MTCRE



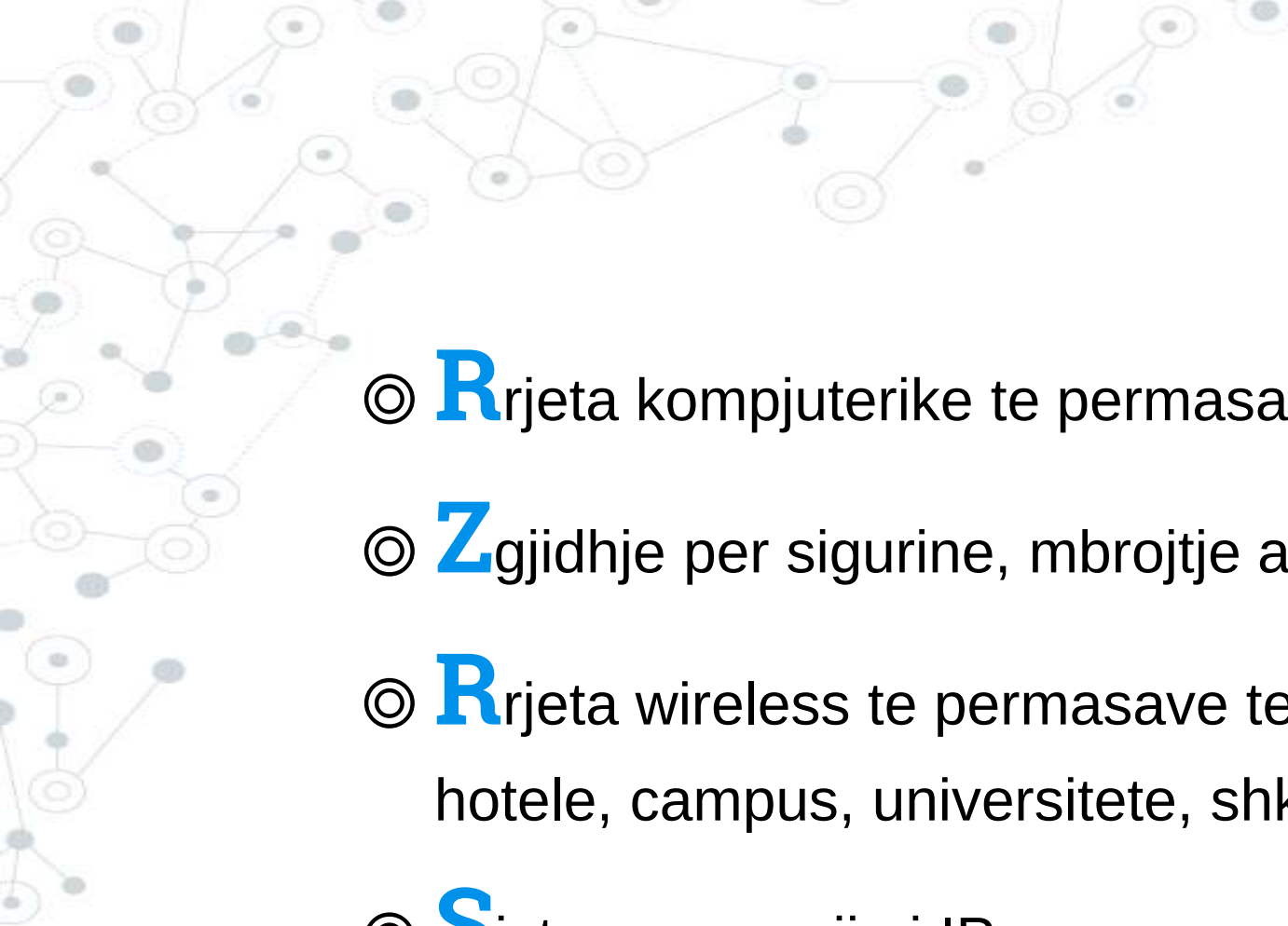
Ekspertize ne:

Windows Servers, Domain Controller AD, Linux Servers dhe Networking. Konsulent ne rrjete kompjuterike, rutera, switche dhe wireless, specifikisht MikroTik por dhe brand te tjera. Diplomuar ne Inxhinieri elektrike, Eksperience ne Automatizim Industrie.



Easy Network Solutions

- © **R**rjeta kompjuterike te permasave te ndryshme
- © **Z**gjidhje per sigurine, mbrojtje antivirale
- © **R**rjeta wireless te permasave te medha, kompani, hotele, campus, universitete, shkolla.
- © **S**isteme survejimi IP.
- © **S**isteme VPN.
- © **E**tj...



Projekte

© '2000 - sistem testimi I levizshem ☺



© 2007 – Linku yne i pare prej 31km ne 5GHZ



© '2015 – Ndertim I sistemit te Survejimit
dhe komunikimit me wifi ne Terminalin e Konteinereve, Porti Dures.

Projekte



A background network diagram featuring a complex web of interconnected nodes and lines, with some nodes highlighted in blue and others in grey.

1.a

Sistemet WiFi MikroTik

Mjaft me fjale te pergjithshme!



“

*MikroTik ofron nje game te gjere
produktesh, me nje software te
njejte, qe I hap perdoruesit
horizonte shume te gjera ne
mundesite e konfigurimeve dhe
fushat e perdorimit.*

Pse nevojiten sistemet Wireless?

- ◎ Perdoren sot gjeresisht ne shkolla, universitete, hotele, kompani, ambiente sportive, ambiente rekreative.
- ◎ Kerkesa per te tilla sisteme shtohet dite pas dite
- ◎ Megjithese mund te ndertohet nje sistem, ai do te kerkoje upgrade te mevonshme

...“Produkti” me I kerkuar ne bare, restorante, hotele, nga klientet??

Sa eshte
password i wirelesit?



Pse nevojiten sistemet Wireless?

“The 2015 TripAdvisor TripBarometer further reveals that Wi-Fi is the most important in-room amenity for today’s travelers”

Check In

Check Out

Guests 1 room, 2 adults, 0 children



Price per night

ALL 11,400

Amenities

- ☐ Free Wifi
- ☐ Breakfast included
- ☐ Pool
- ☐ Free Parking
- More ▾

Special offers

- ☐ Only properties with special offers

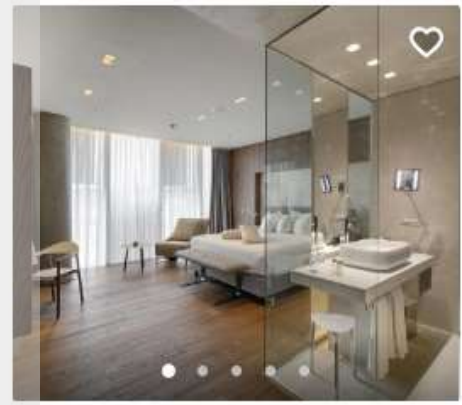
Distance from

e.g. Skanderbeg Square

1 mi ▾

Property type

- ☐ Hotels
- ☐ B&B and Inns



The Plaza Tirana

Booking.com ↗

ALL 18,443

View Deal

Expedia.com ↗

ALL 15,743

Agoda.com ↗

ALL 16,956

Hotel Website ↗

ALL 18,429

View all 6 deals from ALL 15,743 ▾

268 reviews

#1 Best Value of 334 places to stay in Tirana

- Free Wifi
- Free Parking



Hotel Mondial

Booking.com ↗

ALL 10,640

View Deal

Expedia.com ↗

ALL 9,590

HotelsClick ↗

ALL 10,603

TripAdvisor

ALL 9,570

259 reviews

#2 Best Value of 334 places to stay in Tirana

- Free Wifi
- Free Parking



Theranda Hotel

Booking.com ↗

~~ALL 6,660~~

ALL 5,864

Expedia.com ↗

ALL 6,660

TripAdvisor

ALL 5,864

Hotels.com

322 reviews

#3 Best Value of 334 places to stay in Tirana

- Free Wifi
- Free Parking

Rrjet LAN



Asnje sistem wireless nuk mund te funksionojë pa një baze të shëndoshe. Nevojitet një **rrjet lokal robust**, mbi të cilin do të ndertohet sistemi wifi.

Endrra të këqia!



LAN tek klienti

- ◎ Kembengul per krijimin e nje rrjeti te rregullt!
- ◎ Mos mer persiper ndertimin e wifi pa kerkesen e mesiperme!
- ◎ Maksimumi vendos 1 ose 2 wifi per te kaluar situaten kritike te klientit dhe kerko nje kohe te dyte per ndertimin e gjithe rrjetit!



Pajisjet per LAN

- ◎ Rack (sa me l madh, aq me mire) ☺
- ◎ Core Router: RB1xxx, RB3xxx, **RB4xxx**, CCR
- ◎ Switch: CRS1xx, CRS-3xx

Core Router



- ◎ **RB3011**
ARM 32bit, 1.4GHZ Dual Core, 1GB Ram, 128MB NAND, 10 Gigabit Ethernet, 1 SFP



- ◎ **RB1100AHx4**
ARM 32bit, 1.4GHZ 4 Core, 1GB Ram, 128MB NAND, 13 Gigabit Ethernet



- ◎ **CCR-1009**
TILE, 1GHZ 9 Core, 2GB Ram, 128MB NAND, 7 Gigabit Ethernet, 1 Combo, 1 SFP+



- ◎ **RB4011iGS+RM**
ARM 32bit, 1.4GHZ 4 Core, 1GB Ram, 512MB NAND, 10 Gigabit Ethernet, 1 SFP+

Switch



© CRS112-8P-4S-IN
8PoE Gigabit, 4SFP

© CRS328-24P-4S+RM
24PoE Gigabit, 4SFP+





1.b

Pajisjet per wifi

Tani qe rrjetin e kemi te rregullt,
fillojme te mendojme per WiFi!



Frekuenca

2.4GHZ

- + Suportohet nga shumica e pajisjeve
- + Perthyhet me shume
- + Shkon me larg
- Vetem 3 kanale (1/6/11)
- Shume interferenca
- Shume pajisje jo 802.11

5GHZ

- + Shume me teper kanale qe nuk shkelin njeri-tjetrin
- + Shume me pak interferenca
- + Pak pajisje jo 802.11 qe transmetojne ne 5GHZ
- Me pak pajisje klienti me karte wifi 5GHZ



Frekuensi

802.11 Wireless Standards

IEEE Standard	802.11a	802.11b	802.11g	802.11n	802.11ac
Year Adopted	1999	1999	2003	2009	2014
Frequency	5 GHz	2.4 GHz	2.4 GHz	2.4/5 GHz	5 GHz
Max. Data Rate	54 Mbps	11 Mbps	54 Mbps	600 Mbps	1 Gbps

Ambienti i Montimit

Brendshem

- © Mund te perdoren pajisje edhe weatherproof edhe pajisje te thjeshta.
- © Ne pishina, kuzhina, SPA, ku nivelet e lageshtires jane te larta, **rekomandohen** pajisje weatherproof.

Jashtem

- © Duhet perdorur gjithmone pajisje **weatherproof**.
Perdorimi i pajisjeve te tjera nuk garanton nje jetegjatesi te tyre.

Ambienti i Montimit

Jashtem



© SXT2 & SXT SA5



© Basebox 2 & 5



© OmniTik 5ac



© wAP ac Dual Band

Ambienti i Montimit

Brendshem



© wsAP ac lite (Dual Band)



© cAP Lite (2.4)



© cAP ac (Dual Band)



© wAP / BE (2.4)



© wAP ac (Dual Band)

Pozizioni i Montimit



Pozicioni i Montimit

- ☉ Vende tipike
qe duhen
shmangur

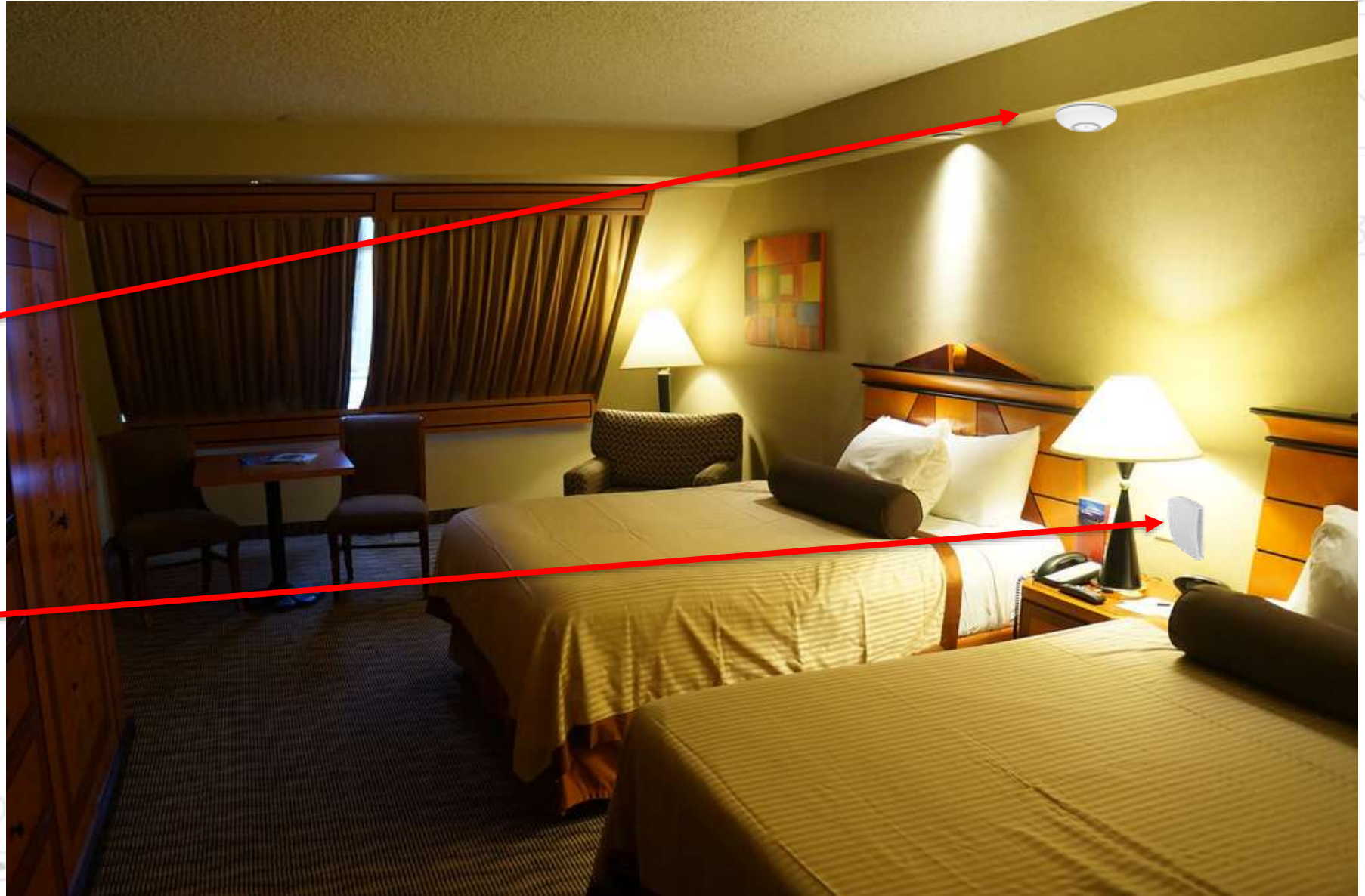


Pozizioni i Montimit

☉ Vende me te pershtatshme

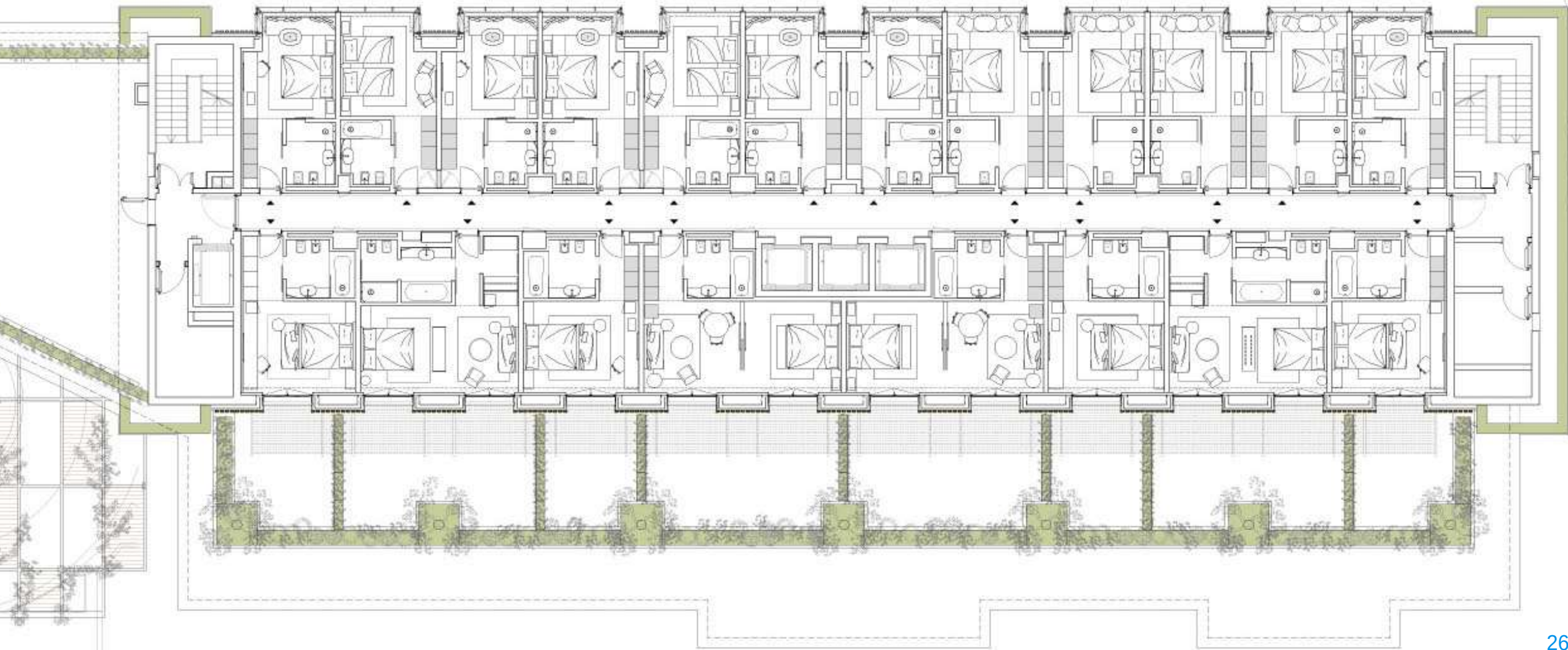
☉ cAP ac

☉ wsAP ac



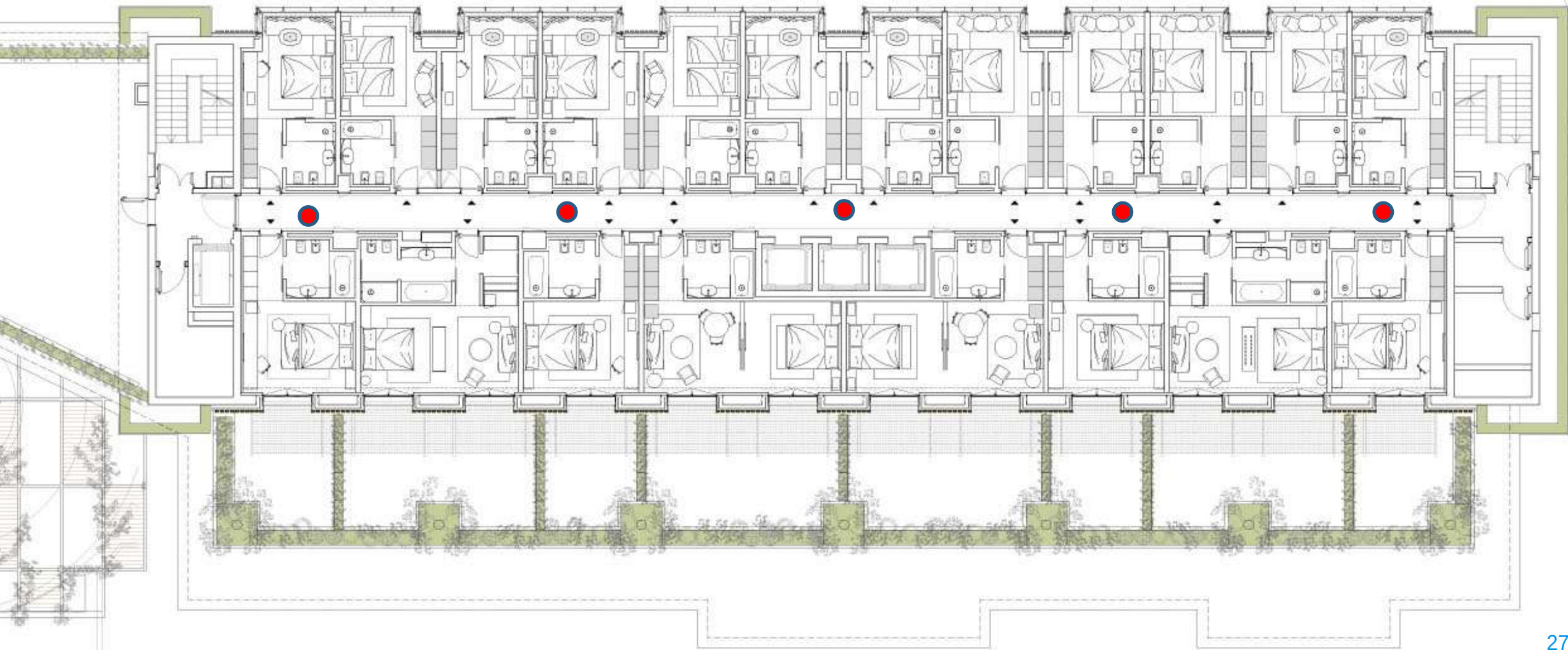
Pozicioni i Montimit

Nje kat hoteli me 20 dhoma



Pozizioni i Montimit

5 x Basebox2 Omni(2.4)



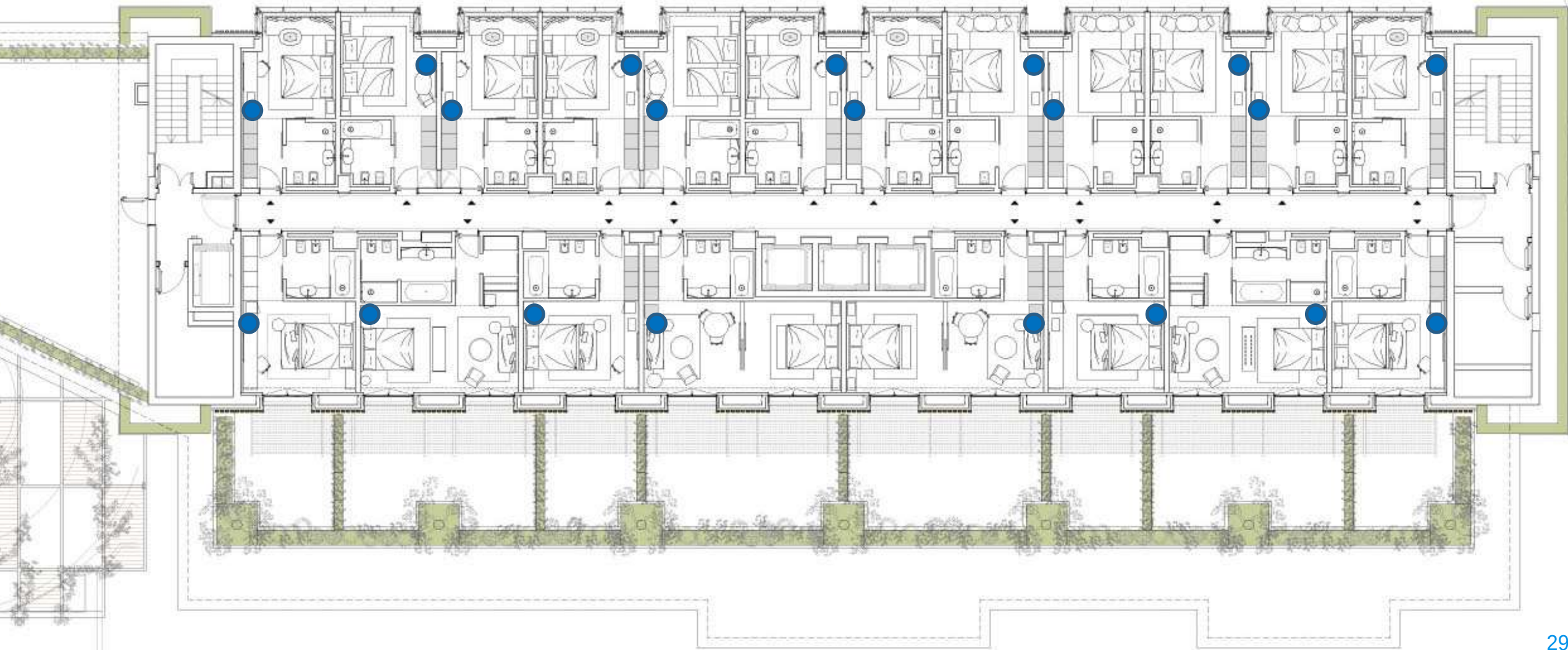
Pozizioni i Montimit

10 x cAP ac ose wsAP ac lite(2.4+5)



Pozizioni i Montimit

20 x wsAP ac lite(2.4+5)

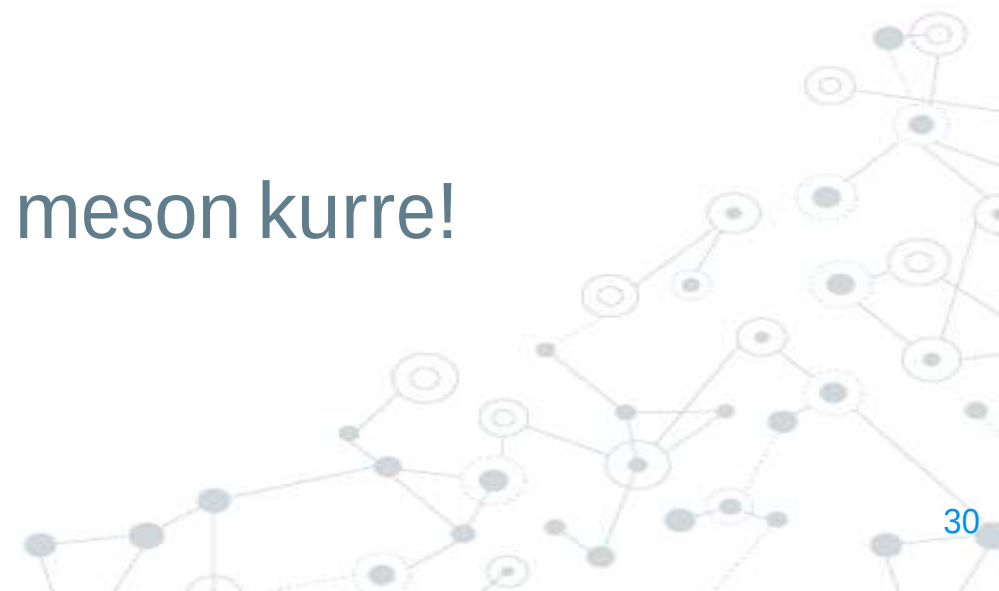


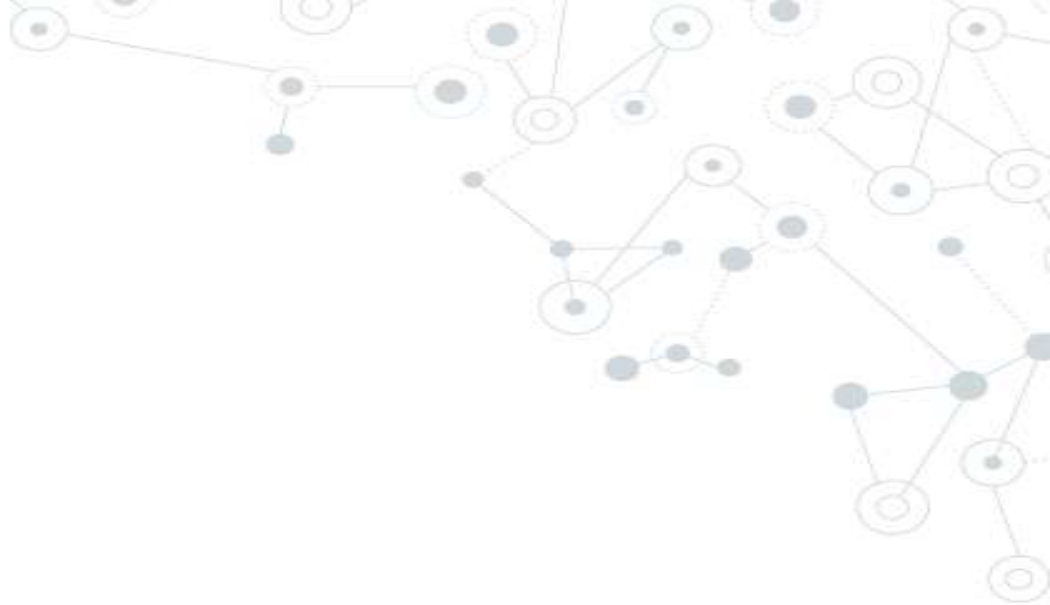


1.c

Gabimet qe bejme me shpesh

Kush nuk gabon kurre, nuk meson kurre!





© Numer i vogel AP!

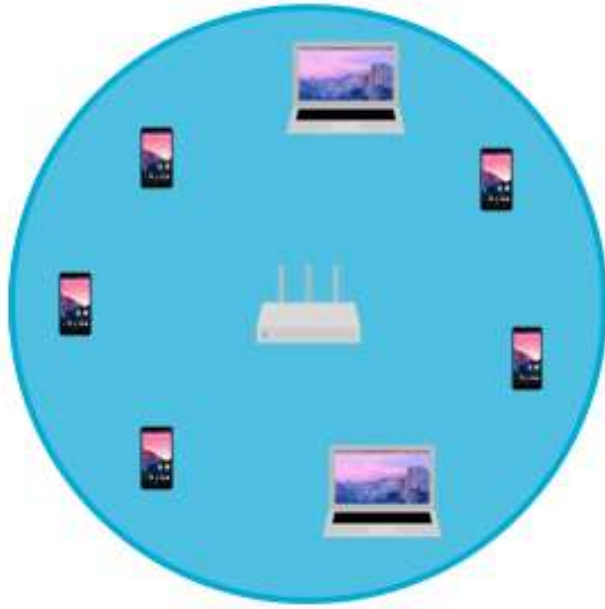
© Numer shume i madh AP!

© Perdorimi i AP te fuqishme (edhe antena te medha)!



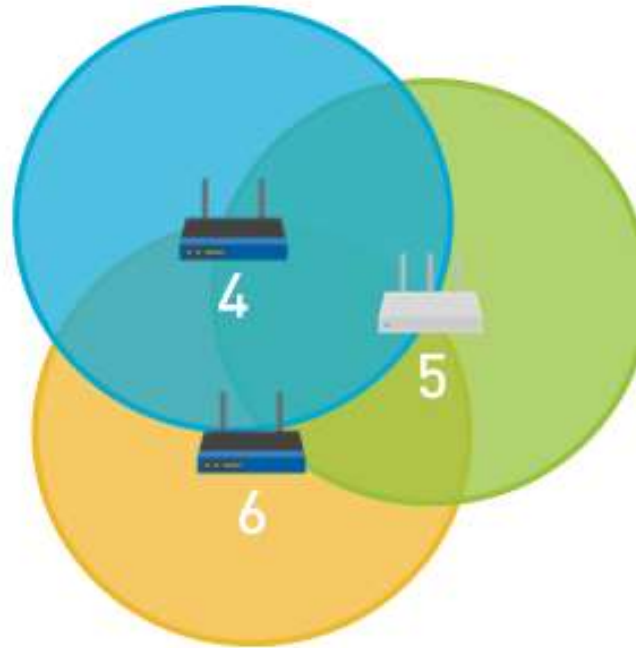
Interferencat

Co-Channel



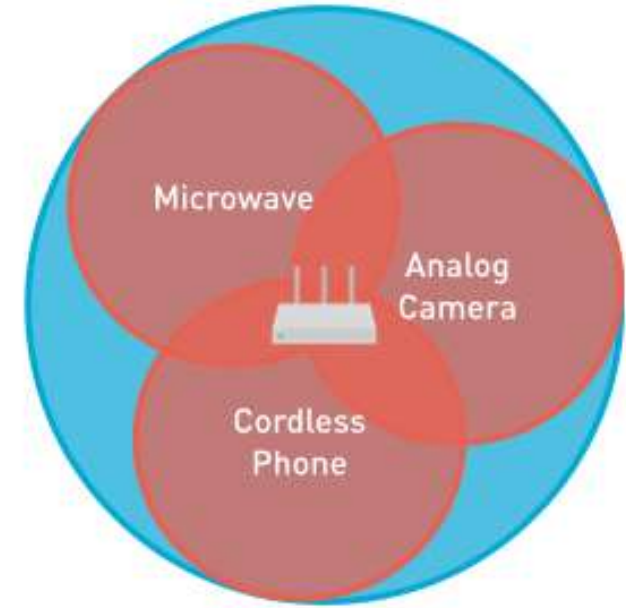
Every client and access point on the same channel competes for time to talk.

Adjacent-Channel



Every client and access point on overlapping channels talk over each other.

Non-Wi-Fi



Non-802.11 devices compete for medium access.

Interferencat/zhurmat

Eleminimi

- © Perdor vetem kanalet **1/6/11** per 2.4 GHZ (2412/2437/2462 MHZ)

Kur antenat jane ne “overlapping channels” kanale te mbivendosura, ato do te shohin sinjalin e antenave te tjera si “zhurme”. Kjo gje do beje qe ato te kerkojne gjithë kohes te transmetojne.

- © Zvogelo numrin e SSID.

Meqenese AP leshon ato qe quhen "beacon" fener zinjalizimi. Ai mban brenda SSID, RadioName, rate etj. Sa me shume SSID qe kemi, aq me shume vonohet AP.



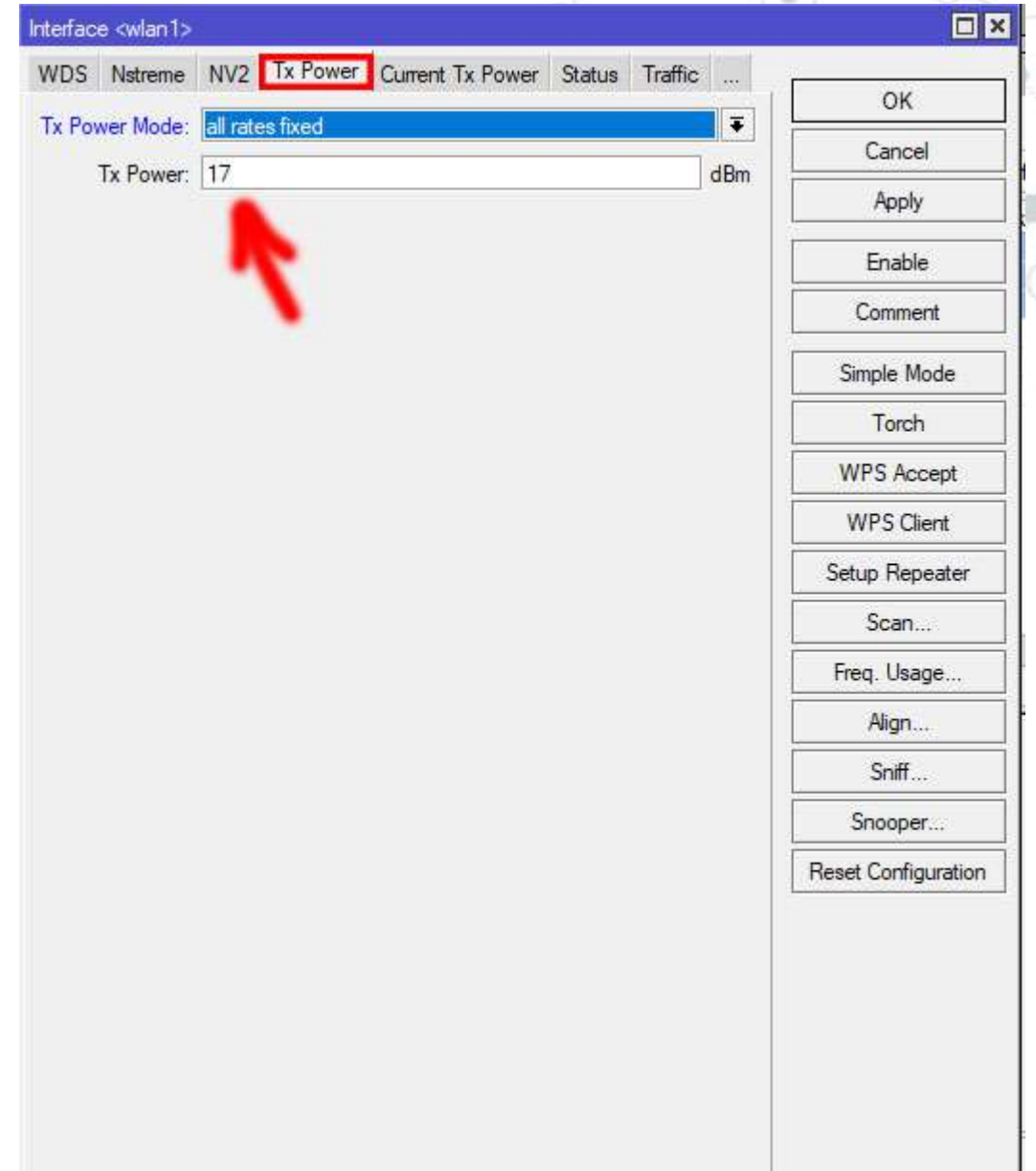
Interferencat/zhurmat

Eleminimi

🎯 UI fuqine e 2.4 GHZ me 6-9 dB

Tek Interface/Advanced Mode/Tx Power-All Rates

Fixed ose CapsMAN/Interface/Channel/TxPower



Interferencat/zhurmat

Session Settings Dashboard

Safe Mode Session: [REDACTED]

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

CAPsMAN

CAP Interface Provisioning Configurations Channels D

+ - [check] [x] [icon] [filter] Manager AAA

	Name	Type	MTU
RSMB	HoTi-1	CAP Interface	1
RSMB	HoTi-2	CAP Interface	1
SMB	HotiNew-1	CAP Interface	1
SMB	HotiNew-2	CAP Interface	1

4 items out of 12 (1 selected)

Interface <HotiNew-2>

General Wireless Channel Rates Datapath Security Status Traffic

Channel: [REDACTED]

Frequency: [REDACTED]

Control Channel Width: [REDACTED]

Band: [REDACTED]

Extension Channel: [REDACTED]

Tx Power: [REDACTED]

Save Selected: [REDACTED]

Reselect Interval: [REDACTED]

Skip DFS Channels: [REDACTED]

OK Cancel Apply Disable Comment Copy Remove Torch Scan...

enabled running slave master bound inactive

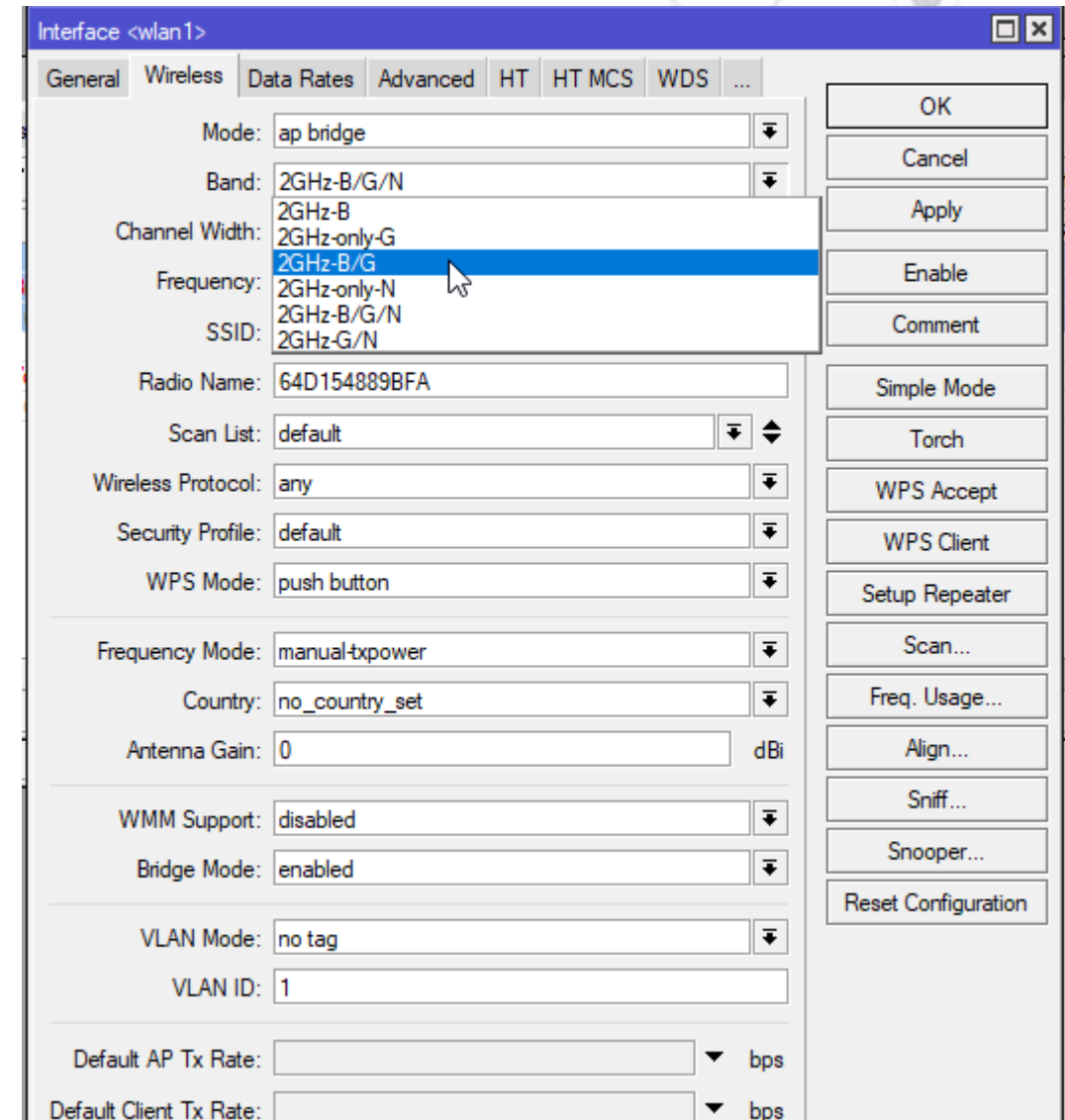
Interferencat/zhurmat

Eleminimi

◎ Hiq mundesine e perdorimit te 802.11b

Tek Interface/Wireless ose

CapsMAN/Configuration/Channel



Interface <wlan1>

General Wireless Data Rates Advanced HT HT MCS WDS ...

Mode: ap bridge

Band: 2GHz-B/G/N

Channel Width: 2GHz-B
2GHz-only-G
2GHz-B/G
2GHz-only-N
2GHz-B/G/N
2GHz-G/N

Frequency: 2GHz-B/G

SSID: 2GHz-B/G/N
2GHz-G/N

Radio Name: 64D154889BFA

Scan List: default

Wireless Protocol: any

Security Profile: default

WPS Mode: push button

Frequency Mode: manual-txpower

Country: no_country_set

Antenna Gain: 0 dBi

WMM Support: disabled

Bridge Mode: enabled

VLAN Mode: no tag

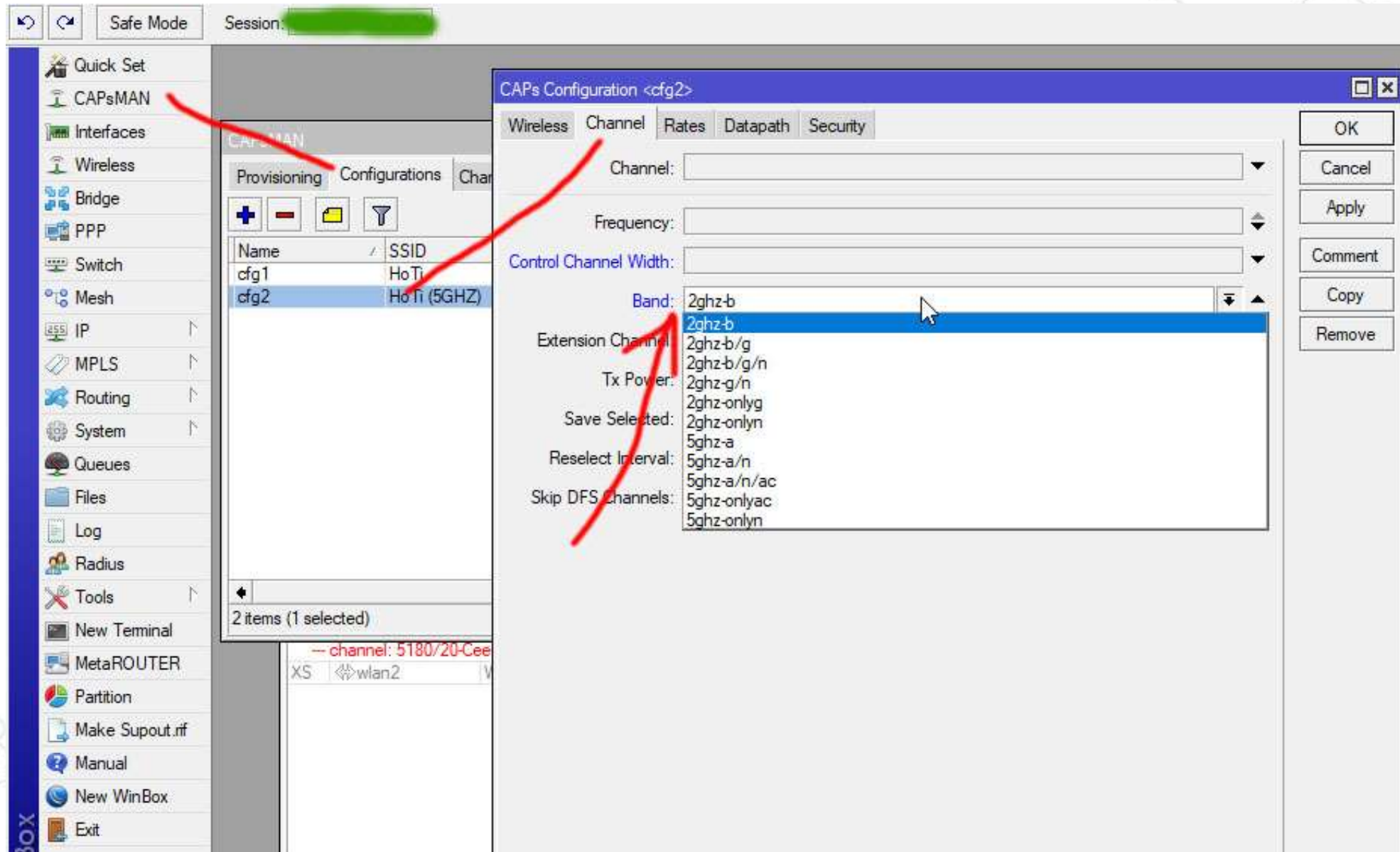
VLAN ID: 1

Default AP Tx Rate: bps

Default Client Tx Rate: bps

OK
Cancel
Apply
Enable
Comment
Simple Mode
Torch
WPS Accept
WPS Client
Setup Repeater
Scan...
Freq. Usage...
Align...
Sniff...
Snooper...
Reset Configuration

Interferencat/zhurmat



◎ Perdor SSID te ndryshme per 2.4GHZ dhe per 5GHZ



Interferencat/zhurmat

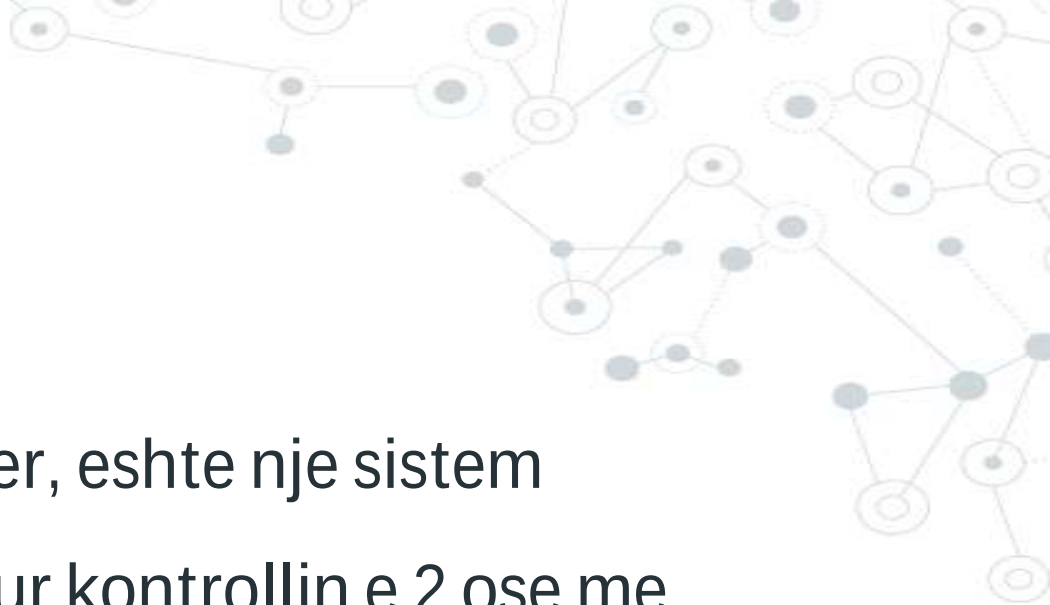
Eleminimi

- ⦿ Mundohu te vendosesh izolim midis antenave (mure, trare, etj)
- ⦿ Zgjidh antenat e AP, mos perdor vetem omni.
- ⦿ Perdor gjithmone “Scan”, per te pasur te qarte se cfare AP te tjera degjohen nga AP ne fjale.



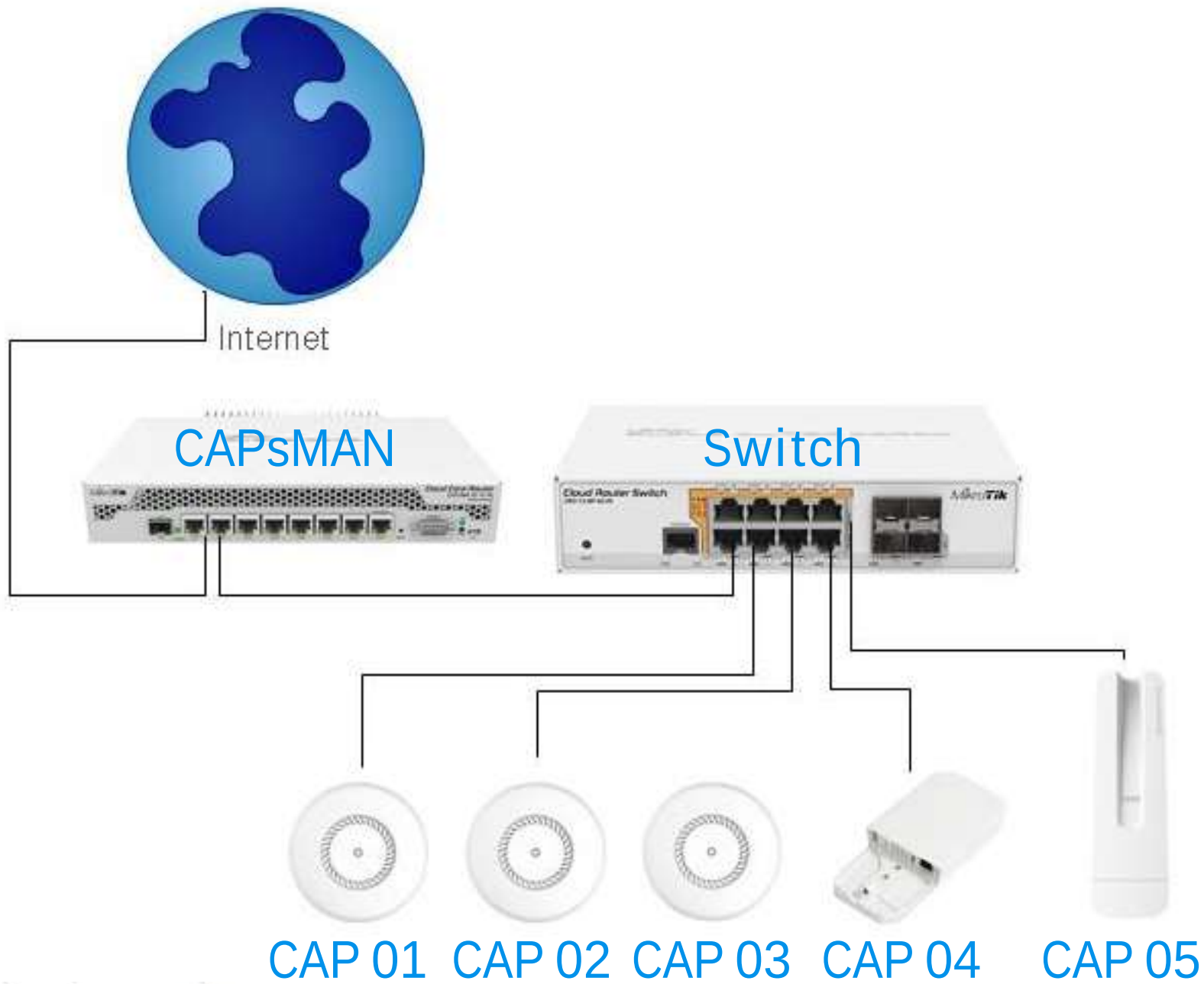


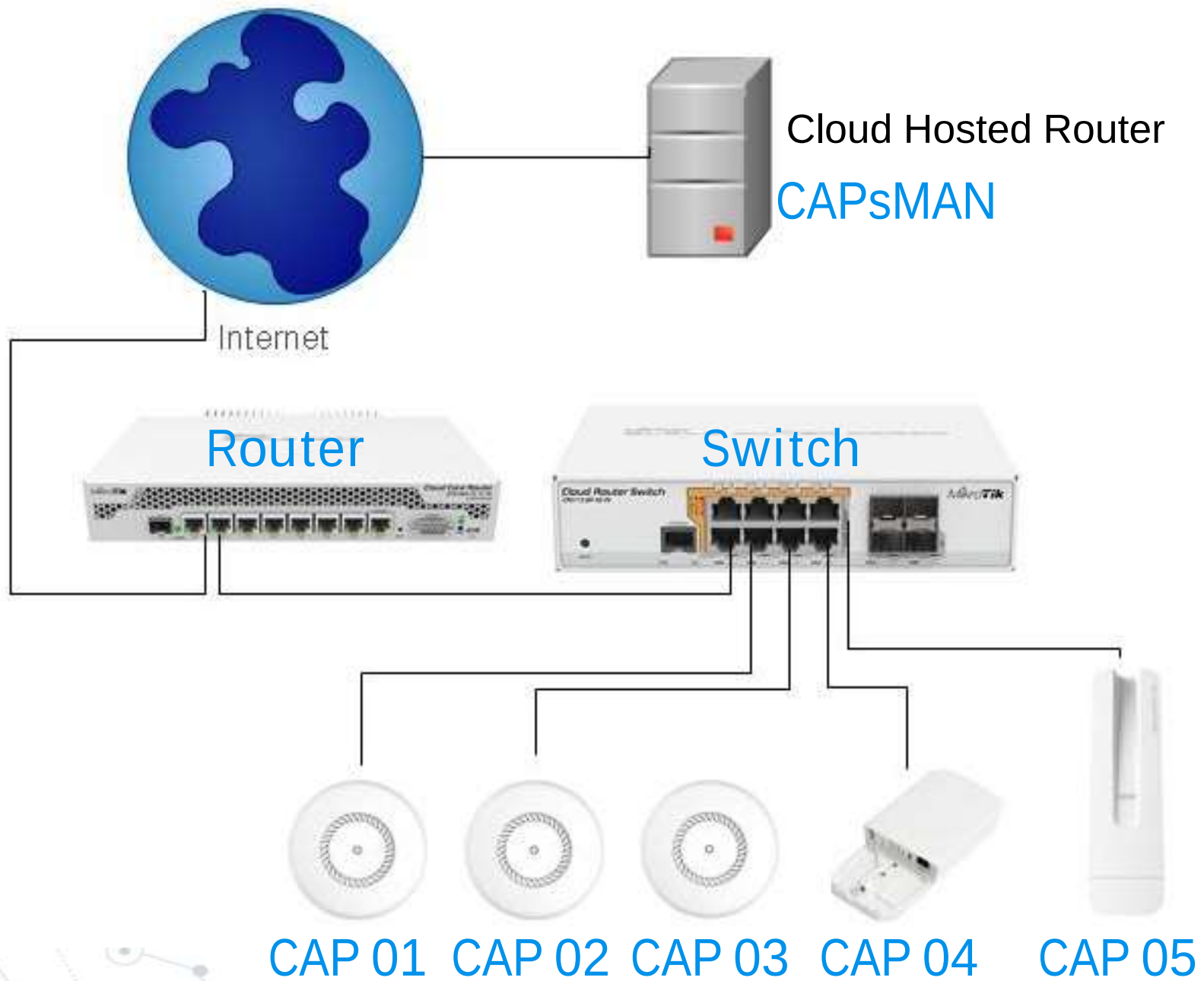
2. **Konfigurimi i CAPsMAN**



CAPsMAN – Controlled Access Point Manager, është një sistem centralizimi nga MikroTik, i cili bën të mundur kontrollin e 2 ose më shumë akses pointesh nga një pikë e vetme.

Cdo AP quhet një CAP, dhe ruteri nga ku bëhet kontrolli, quhet CAPsMANager.





CAPsMAN – Per 5 minuta

- ⦿ Ruteri qe do perdorim pretendohet qe ka konfigurimin minimal si akses ne internet dhe masquerade.
- ⦿ Krijohet nje “bridge” qe do te sherbeje si interface ku do te futen kartat wireless te CAPs. E riemertojme p.sh: BridgeCAPS.
- ⦿ I vendoset ketij “bridge” nje IP e cila do te sherbeje si gateway per klientet e rrjetit wifi.
- ⦿ Ngrihet nje server DHCP tek interface “BridgeCAPS”

min@ (MUM_CAPsMAN) - WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session:

RouterOS WinBox

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
IPv6
MPLS
OpenFlow
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
TR069
MetaROUTER
Partition
Make Supout.nif
Manual
New WinBox
Exit

Bridge Ports VLANs MSTIs

+ - ✓ ✗

Name	Type
R bridge1	Bridge

1 item out of 8

New Interface

General STP VLAN Status Traffic

Name: bridgeCAPS

Type: Bridge

MTU:

Actual MTU:

L2 MTU:

MAC Address:

ARP: enabled

ARP Timeout:

Admin. MAC Address:

Ageing Time: 00:05:00

☐ IGMP Snooping
☐ DHCP Snooping
☐ Fast Forward

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Torch

enabled running slave

1 2 3 4

RouterOS WinBox (MUM_CAPsMAN) - WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh

IP
IPv6
MPLS
OpenFlow
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
TR069
MetaROUTER
Partition
Make Supout.rtf
Manual
New WinBox
Exit

ARP
Accounting
Addresses
Cloud
DHCP Client
DHCP Relay
DHCP Server
DNS
Firewall
Hotspot
IPsec
Kid Control
Neighbors
Packing
Pool
Routes
SMB
SNMP
Services

Bridge

Bridge	Ports	VLANs	MSTIs	Port MST Overrides	Filters
+	-	✓	✗	📄	🔍
Settings					
Name	Type	L2 MTU	Tx		
R bridge1	Bridge	1598			
R bridgeCAPS	Bridge	65535			

New Address

Address: 192.168.8.1/23
Network: [REDACTED]
Interface: bridgeCAPS

OK
Cancel
Apply
Disable
Comment
Copy
Remove

enabled

Address List

Address	Network	Interface
D 192.168.2.42/...	192.168.2.0	bridge1

1 item

1
2
3
4
5

RouterOS WinBox (MUM_CAPsMAN) - WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh

IP ARP Accounting Addresses Cloud DHCP Client DHCP Relay DHCP Server DNS Firewall Hotspot IPsec Kid Control Neighbors Packing Pool Routes SMB SNMP Services

IPv6 MPLS OpenFlow Routing System Queues Files Log Radius Tools New Terminal TR069 MetaROUTER Partition Make Supout.rtf Manual New WinBox Exit

DHCP Server

DHCP Networks Leases Options Option Sets Alerts

DHCP Config DHCP Setup

Name / Interface Rel Lease Time Address Pool Add AR...

DHCP Setup

Select interface to run DHCP server on

DHCP Server Interface: bridgeCAPS

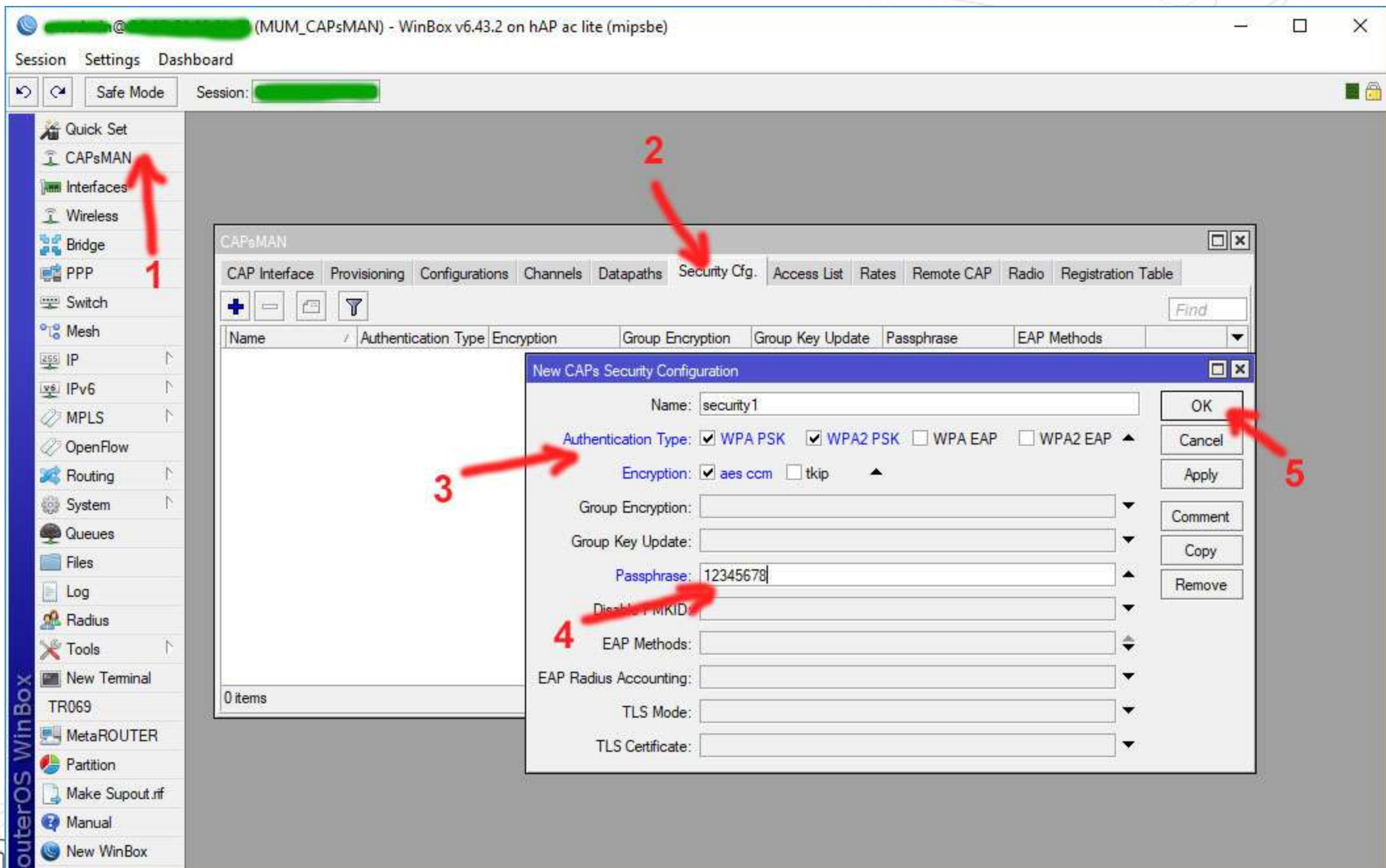
Back Next Cancel

2 items

1 2 3 4 5

CAPsMAN – Per 5 minuta

- ◎ Shkojme tek Capsman, dhe tek Tab “Security”, vendosim te dhenat e tipit te enkriptimit dhe passwordin qe do te perdorin klientet.
- ◎ Tek Tab “Datapath”, vendosim cila do jete rruga qe do perdorin te dhenat tona. Zgjedhim bridge: BridgeCAPS.
- ◎ Tek Tab “Configurations”, shtojme nje konfigurim te ri, dhe fusim opsionet: AP, SSID. Nuk i japim OK.
- ◎ Tek Tab “Datapath” I dritares “new CAPs Configuration”, zgjedhim “bridgeCAPS”, dhe tek “Security” zgjedhim profilin “security1”. Japim “OK”.



WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
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Mesh
IP
IPv6
MPLS
OpenFlow
Routing
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Radius
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New Terminal
TR069
MetaROUTER
Partition
Make Supout.rtf
Manual
New WinBox

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapaths Security Cfg. A

+ - [Icon] [Icon]

Name	Bridge	OpenFlow Sw...	Local For...	Client To ...	VLAN M...
0 items					

New CAPs Datapath Configuration

3 Name: datapath1 OK Cancel

MTU: []

L2 MTU: []

ARP: []

Bridge: bridge1

Bridge Cost: bridge1

Bridge Horizon: [] 4

OpenFlow Switch: []

Local Forwarding: []

Client To Client Forwarding: []

VLAN Mode: []

VLAN ID: []

Interface List: []

5

RouterOS WinBox (MUM_CAPsMAN) - WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP IPv6 MPLS OpenFlow Routing System Queues Files Log Radius Tools New Terminal TR069 MetaROUTER Partition Make Supout.rtf Manual New WinBox Exit

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapaths Security Cfg. Access

+

Name	SSID	Hide SSID	Load Bal...	Country	Channel
0 items					

New CAPs Configuration

Wireless Channel Rates Datapath ...

Name: cfg1

Mode: ap

SSID: MUM_ens

Hide SSID: []

Load Balancing Group: []

Distance: []

Hw. Retries: []

Hw. Protection Mode: []

Frame Lifetime: []

Disconnect Timeout: []

Keepalive Frames: []

Country: []

Max Station Count: []

Multicast Helper: []

HT Tx Chains: []

HT Rx Chains: []

HT Guard Interval: []

OK Cancel Apply Comment Copy Remove

1

2

3

4

RouterOS WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP IPv6 MPLS OpenFlow Routing System Queues Files Log Radius Tools New Terminal TR069 MetaROUTER Partition Make Supout.rif Manual New WinBox Exit

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapaths Security Cfg. Access

+ - [] []

Name	SSID	Hide SSID	Load Bal...	Country	Channel
0 items					

New CAPs Configuration

Channel Rates Datapath Security ...

1 Datapath: datapath1

2 Local Forwarding: ☐ Client To Client Forwarding: ☐

3

MTU: L2 MTU: ARP: Bridge: Bridge Cost: Bridge Horizon: OpenFlow Switch: VLAN Mode: VLAN ID: Interface List:

OK Cancel Apply Comment Copy Remove

RouterOS WinBox (MUM_CAPsMAN) - WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP IPv6 MPLS OpenFlow Routing System Queues Files Log Radius Tools New Terminal TR069 MetaROUTER Partition Make Supout.rtf Manual New WinBox Exit

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapaths Security Cfg. Access

+ - [Icon] [Icon]

Name	SSID	Hide SSID	Load Bal...	Country	Channel
0 items					

New CAPs Configuration

Channel Rates Datapath Security ...

Security: security1

Authentication Type: [Dropdown]

Encryption: [Dropdown]

Group Encryption: [Dropdown]

Group Key Update: [Dropdown]

Passphrase: [Dropdown]

Disable PMKID: [Dropdown]

EAP Methods: [Dropdown]

EAP Radius Accounting: [Dropdown]

TLS Mode: [Dropdown]

TLS Certificate: [Dropdown]

OK Cancel Apply Comment Copy Remove

1 2

CAPsMAN – Per 5 minuta

- © Ne dritaren kryesore “Capsman” shkojme tek tab “Provisioning”, dhe vendosim te dhenat: Action: create enabled, Master configuration: cfg1
- © Tek tab “Cap Interface”, klikojme “Manager”:Enabled, dhe japim OK.

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapaths Security Cfg. Access List Rates Remote CAP Radio Registration Table

Radio MAC Identity Regexp Common Name Regexp IP Address Ranges Action Master Configuration Slave Configuration Name Format Name Prefix

0 items

New CAPs Provisioning

Radio MAC: 00:00:00:00:00:00

Hw. Supported Modes:

Identity Regexp:

Common Name Regexp:

IP Address Ranges:

Action: create enabled

Master Configuration: cfg1

Slave Configuration:

Name Format: cap

Name Prefix: identity

OK Cancel Apply Disable Comment Copy Remove

RouterOS WinBox (MUM_CAPsMAN) - WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP IPv6 MPLS OpenFlow Routing System Queues Files Log Radius Tools New Terminal TR069 MetaROUTER Partition Make Supout.rtf Manual New WinBox Exit

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapath Security Cfg. Access List Rates Remote CAP Radio Registration Table

+ - [check] [x] [icon] [icon] Reselect Channel Manager AAA Find

Name	Type	Tx Packet (p/s)
0 items out of 9		

CAPs Manager

3 → ☒ Enabled

Certificate: [dropdown]

CA Certificate: [dropdown]

☐ Require Peer Certificate

Generated Certificate: [text]

Generated CA Certificate: [text]

Package Path: [text]

Upgrade Policy: none [dropdown]

OK Cancel Apply Interfaces

4 →

CAPsMAN – Per 5 minuta

- © Nese ruteri ku po konfigurojme CAPsMAN ka karta wireless, atehere edhe keto karta mund te futen ne konfigurimin CAPsMAN.
- © Ne kete rast, shkojme tek Wireless, dhe shtypim butonin CAP. Vendosim opsionet si ne figure.
- © Pamja perfundimtare do te jete si ne figuren ne faqen nr.59
- © Bejme dy hapat e fundit tek te gjitha CAP.

RouterOS WinBox (MUM_CAPsMAN) - WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP IPv6 MPLS OpenFlow Routing System Queues Files Log Radius Tools New Terminal TR069 MetaROUTER Partition Make Supout.tif Manual New WinBox Exit

Wireless Tables

WiFi Interfaces W60G Station Nstreme Du Access List Registration Connect List Security Profiles Channels

+ - [X] [Y] [Z] CAP WPS Client Setup Repeater Scanner Freq. Usage Alignment Wireless Sniffer Wireless Snooper Find

Name	Type	Actual MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx
XS					0 bps	0	0
XS					0 bps	0	0

CAP

☒ Enabled

Interfaces: wlan1 wlan2

Certificate: none

Discovery Interfaces: ether2

☐ Lock To CAPsMAN

CAPsMAN Addresses: [REDACTED]

CAPsMAN Names: [REDACTED]

CAPsMAN Certificate Common Names: [REDACTED]

Bridge: none

☐ Static Virtual

Requested Certificate: [REDACTED]

Locked CAPsMAN Common Name: [REDACTED]

OK Cancel Apply

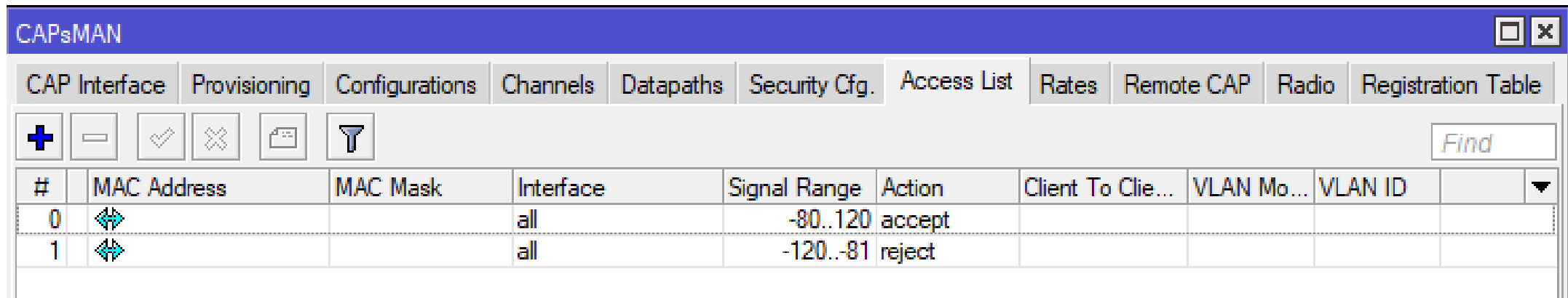
RouterOS WinBox

Me shume

- Shkeputja automatike e klienteve me sinjal te ulet
/caps-man access-list

add action=accept interface=all signal-range=-80..120

add action=reject interface=all signal-range=-120..-81



#	MAC Address	MAC Mask	Interface	Signal Range	Action	Client To Clie...	VLAN Mo...	VLAN ID	
0			all	-80..120	accept				
1			all	-120..-81	reject				

⦿ Vendasja e kanaleve

WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP IPv6 MPLS OpenFlow Routing System Queues Files Log Radius Tools New Terminal TR069 MetaROUTER Partition Make Supout.rtf Manual

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapaths Security Cfg. Access List Rates Remote CAP Radio Registration Table

Find

Name	Frequency	Control Channel ...	Band	Extension Channel	Tx Power
Kanali 01	2412		2ghz-g/n		
Kanali 06	2437		2ghz-g/n		
Kanali 11	2462		2ghz-g/n		

CAPs Channel <Kanali 01>

Name: Kanali 01 OK

Frequency: 2412 Cancel

Control Channel Width: Apply

Band: 2ghz-g/n Comment

Extension Channel: Copy

Tx Power: Remove

Save Selected:

Reselect Interval:

Skip DFS Channels:

CAPs Channel <Kanali 06>

Name: Kanali 06 OK

Frequency: 2437 Cancel

Control Channel Width: Apply

Band: 2ghz-g/n Comment

Extension Channel: Copy

Tx Power: Remove

Save Selected:

Reselect Interval:

Skip DFS Channels:

CAPs Channel <Kanali 11>

Name: Kanali 11 OK

Frequency: 2462 Cancel

Control Channel Width: Apply

Band: 2ghz-g/n Comment

Extension Channel: Copy

Tx Power: Remove

Save Selected:

Reselect Interval:

Skip DFS Channels:

h@ (MUM_CAPsMAN) - WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session:

Quick Set

CAPsMAN

Interfaces

Wireless

Bridge

PPP

Switch

Mesh

IP

IPv6

MPLS

OpenFlow

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

TR069

MetaROUTER

Partition

Make Supout.tif

Manual

New WinBox

Exit

CAPsMAN

CAP Interface Provisioning Configurations

	Name	Type
MB	MUM_CAPsMAN-1	CAP Interf
MB	MUM_CAPsMAN-2	CAP Interf

2 items out of 11 (1 selected)

2 items out of 11

Interface <MUM_CAPsMAN-1>

General Wireless Channel Rates Datapath Security Status Traffic

2

Channel: Kanali 01
Kanali 01
Kanali 06
Kanali 11

Frequency:

Control Channel Width:

Band:

Extension Channel:

Tx Power:

Save Selected:

Reselect Interval:

Skip DFS Channels:

OK

Cancel

Apply

Disable

Comment

Copy

Remove

Torch

Scan...

Reselect Channel

et (p/s)	Rx Pack
0	0

enabled

running

slave

master

bound

inactive

© Vendosja e disa konfigurimeve

WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode

Session: [redacted]

Quick Set

CAPsMAN

Interfaces

Wireless

Bridge

PPP

Switch

Mesh

IP

IPv6

MPLS

OpenFlow

Routing

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Queues

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Make Supout.rf

Manual

CAPsMAN

Provisioning Configurations

+ - [icon] [icon]

Name	SSID
cfg1	MUM_en
cfg2	HIGH SP

2 items (1 selected)

CAPs Configuration <cfg2>

Wireless Channel Rates Datapath Security

Name: **cfg2**

Mode: ap

SSID: HIGH SPEED_MUM_ens

Hide SSID:

Load Balancing Group:

Distance:

Hw. Retries:

Hw. Protection Mode:

Frame Lifetime:

Disconnect Timeout:

Keepalive Frames:

Country:

Max Station Count:

Multicast Helper:

HT Tx Chains:

HT Rx Chains:

HT Guard Interval:

OK

Cancel

Apply

Comment

Copy

Remove

⦿ Vendasja e disa konfigurimeve

WinBox v6.43.2 on hAP ac lite (mipsbe)

Session Settings Dashboard

Safe Mode Session: [REDACTED]

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP IPv6 MPLS OpenFlow Routing System Queues Files Log Radius Tools New Terminal TR069 MetaROUTER

CAPsMAN

CAP Interface Provisioning Configurations

MI MUM_CAPsMAN-1 CAP Interf

MI MUM_CAPsMAN-2 CAP Interf

2 items out of 11 (1 selected)

Interface <MUM_CAPsMAN-1>

General Wireless Channel Rates Datapath Security Status Traffic

Configuration: cfg2

Mode: ap

SSID: HIGH SPEED_MUM_ens

Hide SSID:

Load Balancing Group:

Distance:

Hw. Retries:

Hw. Protection Mode:

Frame Lifetime:

Disconnect Timeout:

Keepalive Frames:

Country:

Max Station Count:

Multicast Helper:

OK Cancel Apply Disable Comment Copy Remove Torch Scan... Reselect Channel

1

2

3



3.

Monitorimi i mbulimit.

- 
- © Ekzistojne shume software te ndryshem, te cilet bejne te mundur krijimin e atyre qe quhet “HeatMap”, pra te hartes se mbulimit me wifi.
 - © Cdo inxhinier zgjedh ate qe i pershtatet me shume ne platforme, kosto, prakticitet.



◎ Mobile Testing Station

Laptop (Win ose MAC).
(Une perdor nje Lenovo Yoga 2 Pro)

Kootek AC 600Mbps USB Wireless
Dual Band - \$17.99

Premiertek 802.11a/b/g/n/ac Dual
Band - \$26.99

Kebidu 2.4+5 Ghz Wireless USB WiFi
Adapter 600Mbps - \$6.96

© NetSPOT (macOS 10.10+ ose Windows 7/8/10)

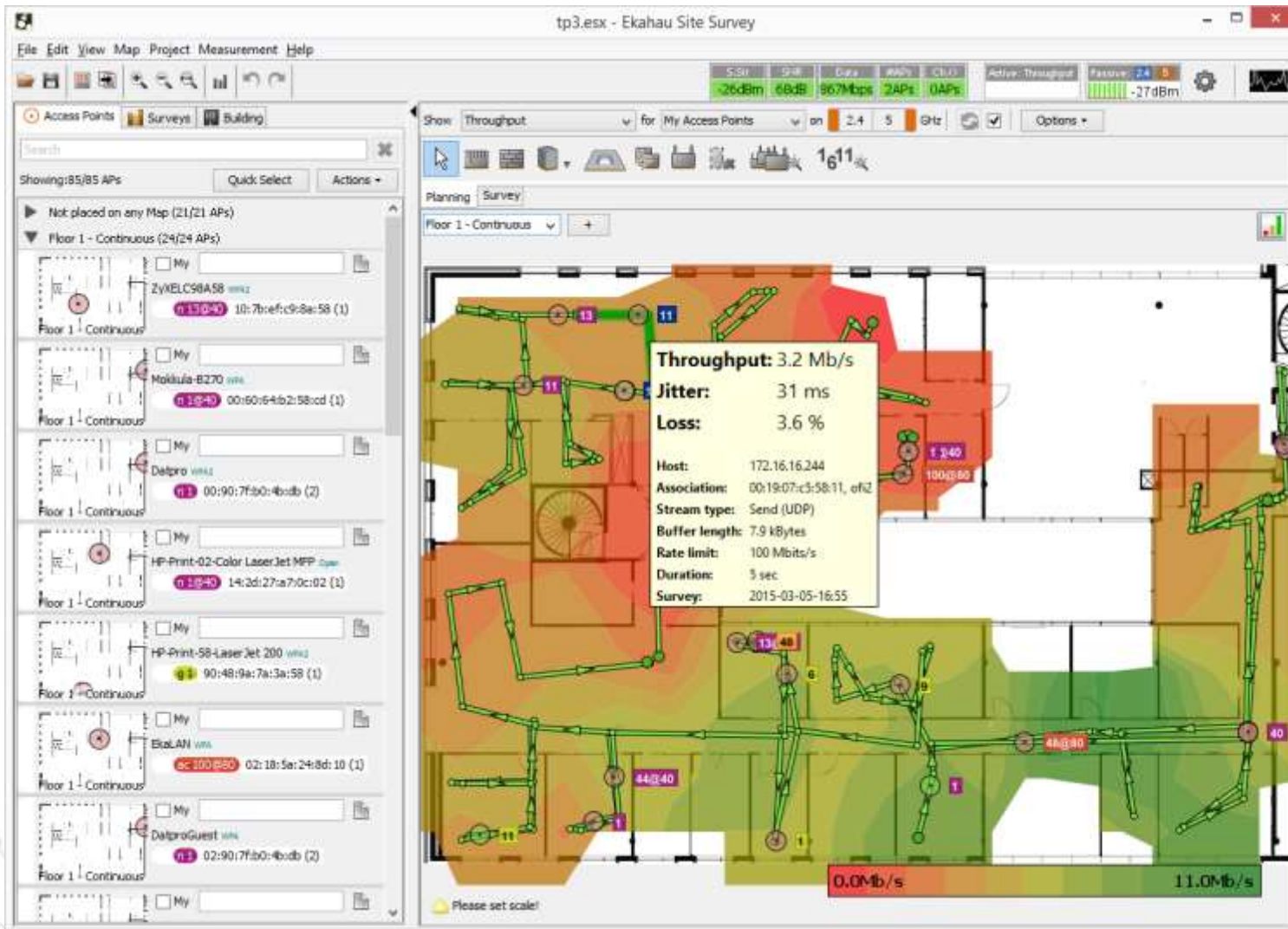


Versioni Home
49USD, 2 zona

Versioni PRO
149USD, 50 zona

Versioni Ent.
499USD, zona pa
limit

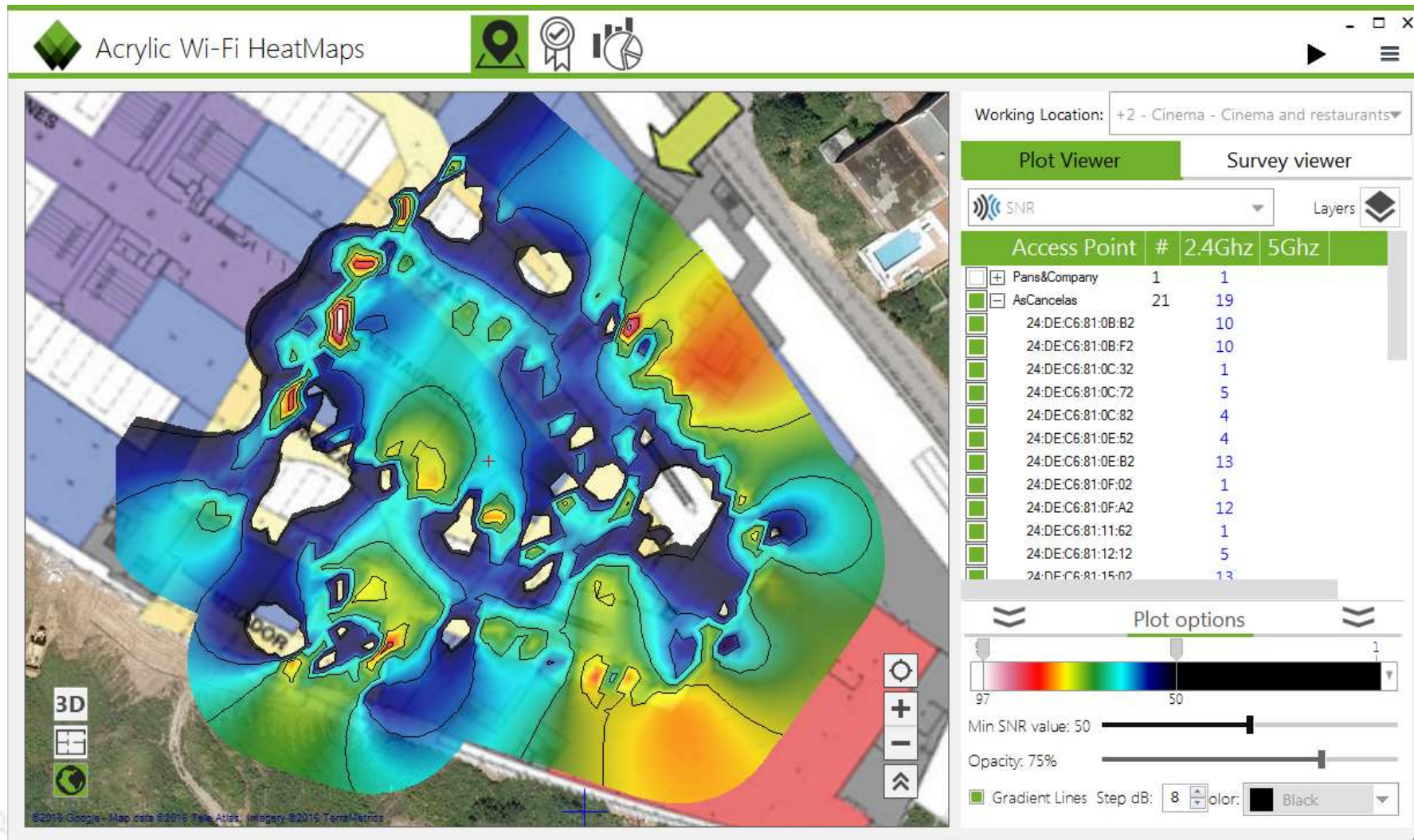
Ekahau HeatMapper (Windows 7/8/10)



Version i
shkarkueshem

FALAS

© Acrylic Wi-Fi Heatmaps (Windows 7/8/10)



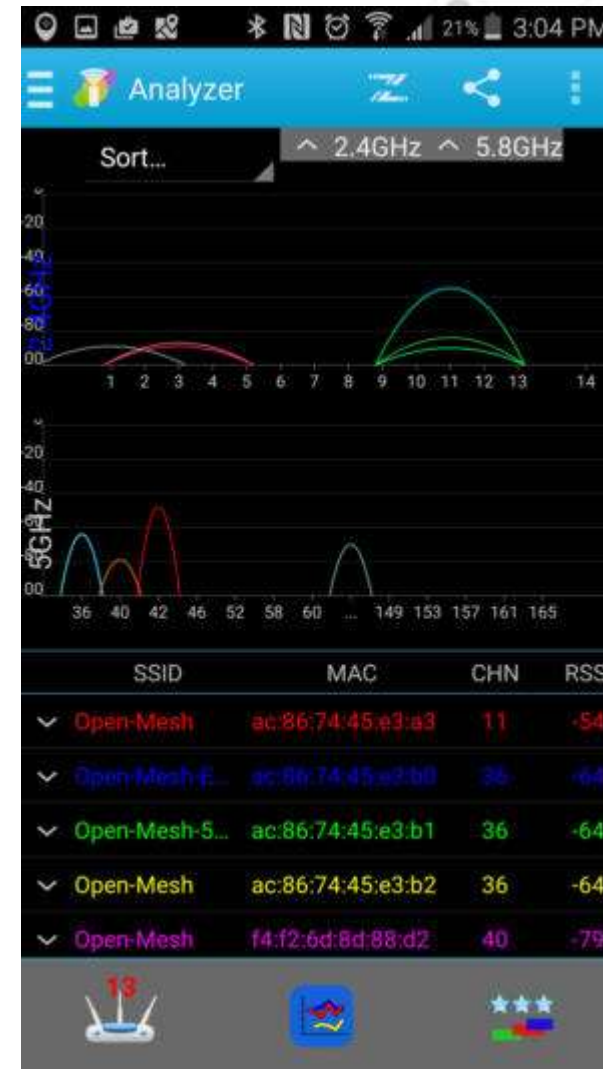
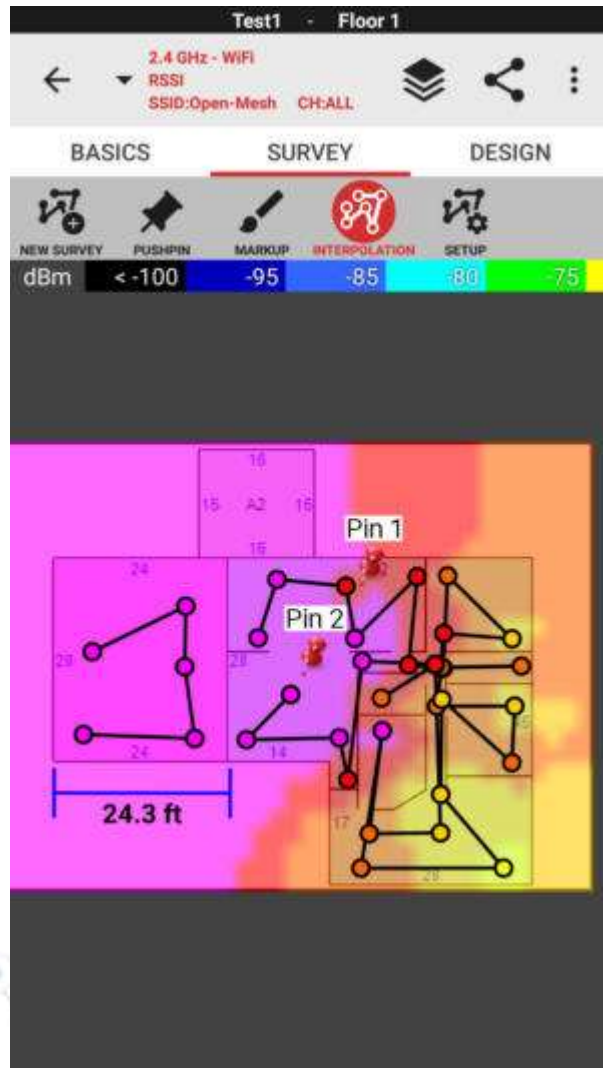
1 Muaj
129USD

3 Muaj
325USD

Pergjithmone
2199USD

© iBwave Wi-Fi Mobile (android)

(625USD/3muaj)



© iMapper Wifi Pro (android)

(8USD)

Perfundimi?!?

Pas te gjitha ketyre shpresojme te kemi:

- © Rrjet LAN stabel, duke minimizuar defektet.
- © Rrjet Wireless homogjen dhe te shpejte.
- © Fatura te paguara.
- © Feedback te mire.

That's All Folks!

Pyetje?

Per cdo diskutim:
erioni@gmail.com

