

# Centralizovana kontrola bežične mreže uz korišćenje Mikrotik CAPsMAN V2

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# O predavaču

- ▣ Inženjer informatike
- ▣ U IT od 1995. godine, vlasnik InterCom Computers-a
- ▣ Wireless servis provajder od 2005. godine
- ▣ Mikrotik trener od 2011 godine, Nr. 121
- ▣ MTCNA, MTCRE, MTCTCE, MTCWE
- ▣ Mikrotik konsultant za servis RouterBOARD-ova



# Mikrotik Treninzi

- ▣ Prvi trening centar u Srbiji
- ▣ Prvi trening je održan 2012. godine
- ▣ Do sada je održano preko 20 treninga, sertifikovano preko 200 polaznika
- ▣ Naredni trening MTCWE - 11.10.2016 , Beogradu
- ▣ Najave narednih treninga i bliže informacije možete pronaći na web stranici InterCom Computers-a **[www.intercom.rs](http://www.intercom.rs)**



# Glavne teme

- ▣ Praktična primena CAPsMAN-a
- ▣ Prednost CAPsMAN-a
- ▣ Projektovanje na osnovu potreba
- ▣ Izbor uređaja na osnovu zahteva
- ▣ Instalacija i kontrola
- ▣ Praktični primer instalacije
- ▣ Problemi u praktičnom radu i eksplotaciji



# Praktična primena

- ▣ CAPsMAN sistem se može koristiti za
- ▣ Wireless ISPs
- ▣ Wireless CCTV
- ▣ Wireless VoIP
- ▣ Wireless SCADA
- ▣ Etc...



# Praktična primena

- ▣ CAPsMAN kontrolni sistem može se koristiti u:
- ▣ Bolnicama
- ▣ Univerzitetima
- ▣ Industiji
- ▣ Ugostiteljstvu (hoteli, restorani...)
- ▣ Kući



# CAPsMAN rešava probleme

- ▣ Pokrivenost Wi-Fi signalom
- ▣ Prekid konekcije prilikom prelaska sa jednog AP-a na drugi AP
- ▣ Kontrola korisnika
- ▣ Ograničenje pristupa mreži
- ▣ Ograničenje brzine korisnicima
- ▣ Zaštita mreže od zloupotrebe



# Prednost CAPsMAN-a

- ▣ Minimalno vreme neophodno za instalaciju
- ▣ Jednostavno podešavanje
- ▣ Preglednost statistike o mreži
- ▣ Velika pouzdanost
- ▣ Ne zahteva posebno održavanje
- ▣ **Veoma povoljno rešenje!!!**

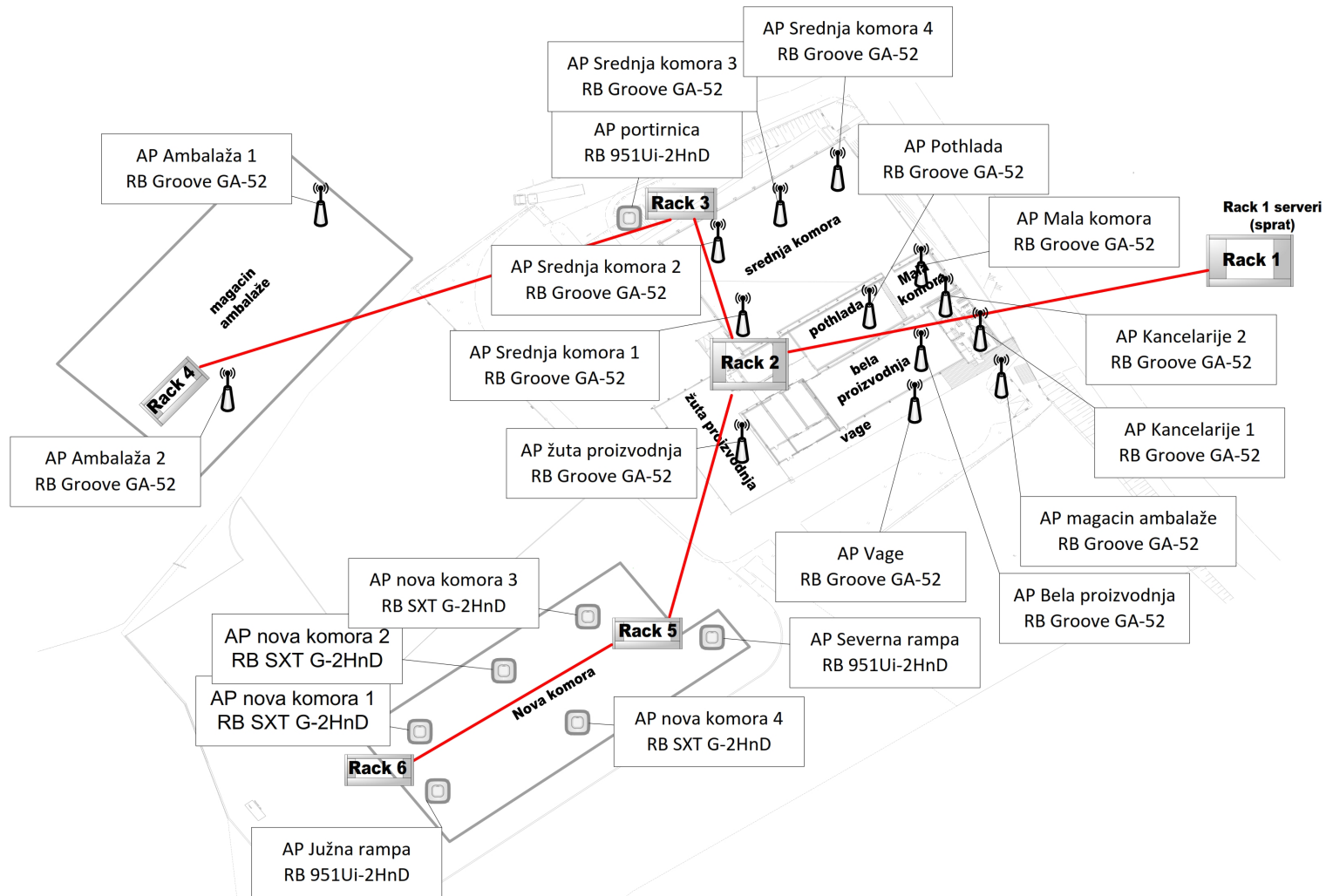




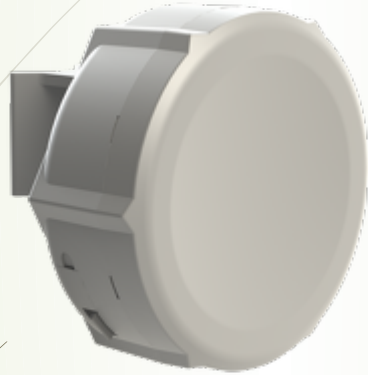
# Zahtev korisnika

- ▣ Površina objekata 2500 m<sup>2</sup>
- ▣ Ekstremni uslovi rada
- ▣ Do 100 korisnika na mreži
- ▣ Korišćenje wifi data kolektor-a
- ▣ Maksimalna pokrivenost Wi – Fi signalom
- ▣ Lako proširenje mreže u novoizgrađenom objektu
- ▣ Stalni pristup mreži bez obzira u kom delu objekta se korisnik nalazi
- ▣ Odvojene podmrežne grupe
- ▣ Kontrola autorizovanog pristupa
- ▣ Temperatura u objektima od +0°C do -25°C
- ▣ Failover za korisnike
- ▣ Rad 24hx365 dana

# Projektovanje na osnovu potreba



## Izbor uređaja na osnovu zahteva



Mikrotik SXT SA5 ac



Mikrotik mANTBox



Mikrotik cAP



Mikrotik SXT 2



Mikrotik OmniTIK 5



Mikrotik GrooveA 52 ac



Mikrotik wAP ac



Metal 52 ac  
Mikrotik Groove

## Izbor uređaja na osnovu zahteva



Mikrotik hEX



Mikrotik RB2011iL-RM



Mikrotik RB3011UiAS-RM



Mikrotik CCR1009-8G-1S-PC

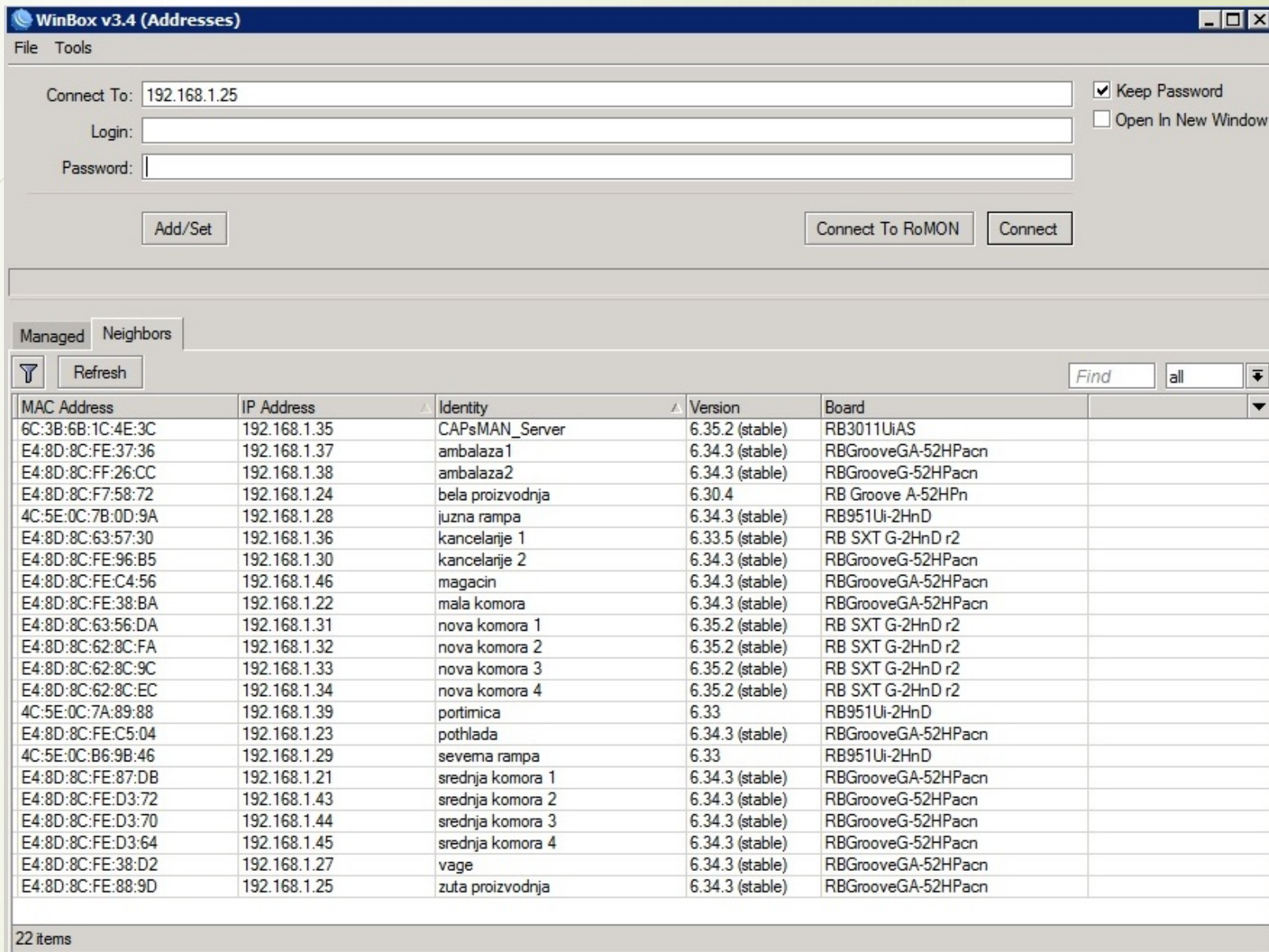


Mikrotik CCR1016-12G



Mikrotik CCR1036-8G-2S+EM

# Instalacija i kontrola



The screenshot displays the WinBox v3.4 (Addresses) application window. The interface includes a menu bar with 'File' and 'Tools', and a main area for connection configuration. The 'Connect To' field is set to '192.168.1.25'. There are input fields for 'Login' and 'Password', and a 'Keep Password' checkbox which is checked. An 'Open In New Window' checkbox is unchecked. Below these fields are buttons for 'Add/Set', 'Connect To RoMON', and 'Connect'. The main area is divided into 'Managed' and 'Neighbors' tabs, with the 'Managed' tab selected. A 'Refresh' button and a search field are also present. The table below lists 22 managed devices with columns for MAC Address, IP Address, Identity, Version, and Board.

MAC Address	IP Address	Identity	Version	Board
6C:3B:6B:1C:4E:3C	192.168.1.35	CAPsMAN_Server	6.35.2 (stable)	RB3011UiAS
E4:8D:8C:FE:37:36	192.168.1.37	ambalaza1	6.34.3 (stable)	RBGrooveGA-52HPacn
E4:8D:8C:FF:26:CC	192.168.1.38	ambalaza2	6.34.3 (stable)	RBGrooveG-52HPacn
E4:8D:8C:F7:58:72	192.168.1.24	bela proizvodnja	6.30.4	RB Groove A-52HPn
4C:5E:0C:7B:0D:9A	192.168.1.28	juzna rampa	6.34.3 (stable)	RB951Ui-2HnD
E4:8D:8C:63:57:30	192.168.1.36	kancelarije 1	6.33.5 (stable)	RB SXT G-2HnD r2
E4:8D:8C:FE:96:B5	192.168.1.30	kancelarije 2	6.34.3 (stable)	RBGrooveG-52HPacn
E4:8D:8C:FE:C4:56	192.168.1.46	magacin	6.34.3 (stable)	RBGrooveGA-52HPacn
E4:8D:8C:FE:38:BA	192.168.1.22	mala komora	6.34.3 (stable)	RBGrooveGA-52HPacn
E4:8D:8C:63:56:DA	192.168.1.31	nova komora 1	6.35.2 (stable)	RB SXT G-2HnD r2
E4:8D:8C:62:8C:FA	192.168.1.32	nova komora 2	6.35.2 (stable)	RB SXT G-2HnD r2
E4:8D:8C:62:8C:9C	192.168.1.33	nova komora 3	6.35.2 (stable)	RB SXT G-2HnD r2
E4:8D:8C:62:8C:EC	192.168.1.34	nova komora 4	6.35.2 (stable)	RB SXT G-2HnD r2
4C:5E:0C:7A:89:88	192.168.1.39	portimica	6.33	RB951Ui-2HnD
E4:8D:8C:FE:C5:04	192.168.1.23	pothlada	6.34.3 (stable)	RBGrooveGA-52HPacn
4C:5E:0C:B6:9B:46	192.168.1.29	sevema rampa	6.33	RB951Ui-2HnD
E4:8D:8C:FE:87:DB	192.168.1.21	srednja komora 1	6.34.3 (stable)	RBGrooveGA-52HPacn
E4:8D:8C:FE:D3:72	192.168.1.43	srednja komora 2	6.34.3 (stable)	RBGrooveG-52HPacn
E4:8D:8C:FE:D3:70	192.168.1.44	srednja komora 3	6.34.3 (stable)	RBGrooveG-52HPacn
E4:8D:8C:FE:D3:64	192.168.1.45	srednja komora 4	6.34.3 (stable)	RBGrooveG-52HPacn
E4:8D:8C:FE:38:D2	192.168.1.27	vage	6.34.3 (stable)	RBGrooveGA-52HPacn
E4:8D:8C:FE:88:9D	192.168.1.25	zuta proizvodnja	6.34.3 (stable)	RBGrooveGA-52HPacn

22 items

# Instalacija i kontrola

aristovic@192.168.1.35 (CAPsMAN\_Server) - WinBox v6.35.2 on RB3011UIAS (arm)

Session Settings Dashboard

Safe Mode Session: 192.168.1.35

CAPsMAN

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

Manager AAA

Name	Type	MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP Tx	FP Rx	FP Tx P
ambalaza 1-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
ambalaza2-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
bela proizvodnja-1	Interfaces	1500	1600	4.8 kbps	0 bps	6	0	0	0 bps	0 bps
juzna rampa-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
kancelarije 1-1	Interfaces	1500	1600	4.8 kbps	624 bps	6	1	0	0 bps	0 bps
kancelarije 2-1	Interfaces	1500	1600	4.8 kbps	0 bps	6	0	0	0 bps	0 bps
magacin-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
mala komora-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
nova komora 1-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
nova komora 2-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
nova komora 3-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
nova komora 4-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
portimica-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
pothlada-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
severna rampa-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
srednja komora 1-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
srednja komora 2-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
srednja komora 3-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps
srednja komora 4-1	Interfaces	1500	1600	4.8 kbps	0 bps	6	0	0	0 bps	0 bps
vage-1	Interfaces	1500	1600	4.8 kbps	0 bps	6	0	0	0 bps	0 bps
zuta proizvodnja-1	Interfaces	1500	1600	0 bps	0 bps	0	0	0	0 bps	0 bps

RouterOS WinBox

21 items out of 33 (1 selected)

# Instalacija i kontrola

aristovic@192.168.1.35 (CAPsMAN\_Server) - WinBox v6.35.2 on RB3011UIAS (arm)

Session Settings Dashboard

Safe Mode Session: 192.168.1.35

Quick Set CAPsMAN

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

Provision Upgrade Set Identity Find

Address	Name	Board	Serial	Version	Identity	Base MAC	State	Radios
192.168.1.34	[E4:8D:8C:62:8C:EC]	RB SXT G-2HnDr2	698C05DBBD78	6.35.2	nova komora 4	E4:8D:8C:62:8C:EC	Run	1
192.168.1.38	[E4:8D:8C:FF:26:CC]	RBGrooveG-52HPacn	722105733862	6.34.3	ambalaza2	E4:8D:8C:FF:26:CC	Run	1
4C:5E:0C:7A:89:88	[4C:5E:0C:7A:89:88]	RB951Ui-2HnD	4AC70448921D	6.33	portimica	4C:5E:0C:7A:89:88	Run	1
4C:5E:0C:7B:0D:9A	[4C:5E:0C:7B:0D:9A]	RB951Ui-2HnD	4AC704CF9FBB	6.34.3	juzna rampa	4C:5E:0C:7B:0D:9A	Run	1
4C:5E:0C:B6:9B:46	[4C:5E:0C:B6:9B:46]	RB951Ui-2HnD	4AC704FD760E	6.33	sevema rampa	4C:5E:0C:B6:9B:46	Run	1
E4:8D:8C:62:8C:9C	[E4:8D:8C:62:8C:9C]	RB SXT G-2HnDr2	698C05E75860	6.35.2	nova komora 3	E4:8D:8C:62:8C:9C	Run	1
E4:8D:8C:62:8C:FA	[E4:8D:8C:62:8C:FA]	RB SXT G-2HnDr2	698C051010EA	6.35.2	nova komora 2	E4:8D:8C:62:8C:FA	Run	1
E4:8D:8C:63:56:DA	[E4:8D:8C:63:56:DA]	RB SXT G-2HnDr2	698C059F39A9	6.35.2	nova komora 1	E4:8D:8C:63:56:DA	Run	1
E4:8D:8C:63:57:30	[E4:8D:8C:63:57:30]	RB SXT G-2HnDr2	698C057A7AA0	6.33.5	kancelarije 1	E4:8D:8C:63:57:30	Run	1
E4:8D:8C:F7:58:72	[E4:8D:8C:F7:58:72]	RB Groove A-52HPn	64A8054F18A9	6.30.4	bela proizvodnja	E4:8D:8C:F7:58:72	Run	1
E4:8D:8C:FE:37:36	[E4:8D:8C:FE:37:36]	RBGrooveGA-52HPacn	7224057A6919	6.34.3	ambalaza 1	E4:8D:8C:FE:37:36	Run	1
E4:8D:8C:FE:38:BA	[E4:8D:8C:FE:38:BA]	RBGrooveGA-52HPacn	722405FCC19E	6.34.3	mala komora	E4:8D:8C:FE:38:BA	Run	1
E4:8D:8C:FE:38:D2	[E4:8D:8C:FE:38:D2]	RBGrooveGA-52HPacn	7224050C15B7	6.34.3	vage	E4:8D:8C:FE:38:D2	Run	1
E4:8D:8C:FE:87:DB	[E4:8D:8C:FE:87:DB]	RBGrooveGA-52HPacn	722405036C69	6.34.3	srednja komora 1	E4:8D:8C:FE:87:DB	Run	1
E4:8D:8C:FE:88:9D	[E4:8D:8C:FE:88:9D]	RBGrooveGA-52HPacn	722405EAD9B7	6.34.3	zuta proizvodnja	E4:8D:8C:FE:88:9D	Run	1
E4:8D:8C:FE:96:B5	[E4:8D:8C:FE:96:B5]	RBGrooveG-52HPacn	72210527F736	6.34.3	kancelarije 2	E4:8D:8C:FE:96:B5	Run	1
E4:8D:8C:FE:C4:56	[E4:8D:8C:FE:C4:56]	RBGrooveGA-52HPacn	722405BB6573	6.34.3	magacin	E4:8D:8C:FE:C4:56	Run	1
E4:8D:8C:FE:C5:04	[E4:8D:8C:FE:C5:04]	RBGrooveGA-52HPacn	7224058D5A00	6.34.3	pothlada	E4:8D:8C:FE:C5:04	Run	1
E4:8D:8C:FE:D3:64	[E4:8D:8C:FE:D3:64]	RBGrooveG-52HPacn	722105E40C7E	6.34.3	srednja komora 4	E4:8D:8C:FE:D3:64	Run	1
E4:8D:8C:FE:D3:70	[E4:8D:8C:FE:D3:70]	RBGrooveG-52HPacn	722105AF25D7	6.34.3	srednja komora 3	E4:8D:8C:FE:D3:70	Run	1
E4:8D:8C:FE:D3:72	[E4:8D:8C:FE:D3:72]	RBGrooveG-52HPacn	7221052FA1EC	6.34.3	srednja komora 2	E4:8D:8C:FE:D3:72	Run	1

RouterOS WinBox

21 items (1 selected)

# Instalacija i kontrola

The screenshot displays the RouterOS WinBox interface for CAPsMAN provisioning. The main window shows a table with 21 rows of configuration data. The table columns are: Radio MAC, Remote CAP Name, Remote CAP Identity, and Interface. The interface includes a sidebar with navigation options like Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, OpenFlow, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, LCD, Partition, Make Supout.rtf, Manual, New WinBox, and Exit. The top status bar shows the session as 'aristovic@192.168.1.35 (CAPsMAN\_Server) - WinBox v6.35.2 on RB3011UIAS (arm)'.

Radio MAC	Remote CAP Name	Remote CAP Identity	Interface
E4:8D:8C:FE:37:37	[E4:8D:8C:FE:37:36]	ambalaza1	ambalaza1-1
E4:8D:8C:FF:26:CD	[E4:8D:8C:FF:26:CC]	ambalaza2	ambalaza2-1
E4:8D:8C:F7:58:73	[E4:8D:8C:F7:58:72]	bela proizvodnja	bela proizvodnja-1
4C:5E:0C:7B:0D:9F	[4C:5E:0C:7B:0D:9A]	juzna rampa	juzna rampa-1
E4:8D:8C:63:57:31	[E4:8D:8C:63:57:30]	kancelarije 1	kancelarije 1-1
E4:8D:8C:FE:96:B6	[E4:8D:8C:FE:96:B5]	kancelarije 2	kancelarije 2-1
E4:8D:8C:FE:C4:57	[E4:8D:8C:FE:C4:56]	magacin	magacin-1
E4:8D:8C:FE:38:8B	[E4:8D:8C:FE:38:8A]	mala komora	mala komora-1
E4:8D:8C:63:56:DB	[E4:8D:8C:63:56:DA]	nova komora 1	nova komora 1-1
E4:8D:8C:62:8C:FB	[E4:8D:8C:62:8C:FA]	nova komora 2	nova komora 2-1
E4:8D:8C:62:8C:9D	[E4:8D:8C:62:8C:9C]	nova komora 3	nova komora 3-1
E4:8D:8C:62:8C:ED	[E4:8D:8C:62:8C:EC]	nova komora 4	nova komora 4-1
4C:5E:0C:7A:89:8D	[4C:5E:0C:7A:89:88]	potirnica	potirnica-1
E4:8D:8C:FE:C5:05	[E4:8D:8C:FE:C5:04]	pothlada	pothlada-1
4C:5E:0C:B6:9B:4B	[4C:5E:0C:B6:9B:46]	sevema rampa	sevema rampa-1
E4:8D:8C:FE:87:DC	[E4:8D:8C:FE:87:DB]	srednja komora 1	srednja komora 1-1
E4:8D:8C:FE:D3:73	[E4:8D:8C:FE:D3:72]	srednja komora 2	srednja komora 2-1
E4:8D:8C:FE:D3:71	[E4:8D:8C:FE:D3:70]	srednja komora 3	srednja komora 3-1
E4:8D:8C:FE:D3:65	[E4:8D:8C:FE:D3:64]	srednja komora 4	srednja komora 4-1
E4:8D:8C:FE:38:D3	[E4:8D:8C:FE:38:D2]	vage	vage-1
E4:8D:8C:FE:88:9E	[E4:8D:8C:FE:88:9D]	zuta proizvodnja	zuta proizvodnja-1



# Instalacija i kontrola

aristovic@192.168.1.35 (CAPsMAN\_Server) - WinBox v6.35.2 on RB3011UIAS (arm)

Session Settings Dashboard

Safe Mode Session: 192.168.1.35

Quick Set CAPsMAN

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

Find

Interface	SSID	MAC Address	Tx Rate	Rx Rate	Tx Signal	Rx Signal	Uptime	Tx/Rx Packets	Tx/Rx Bytes
bela proizvodnja-1	C&P	D0:37:42:2C:C1:C3	54Mbps	1Mbps	0	-45	00:29:47....	467/630	123.6 KiB/92.1 KiB
bela proizvodnja-1	C&P	84:55:A5:A3:AF:4E	26Mbps...	19.5Mbp...	0	-47	00:21:31....	3/19	350 B/1638 B
bela proizvodnja-1	C&P	94:EB:CD:0B:30:F9	65Mbps...	39Mbps...	0	-48	00:09:02....	149/224	29.7 KiB/50.1 KiB
kancelarije 1-1	C&P	B4:AE:2B:E4:1B:74	36Mbps	65Mbps...	0	-66	13:20:19....	7 828 878/2 302 ...	10.2 GiB/214.9 MiB
kancelarije 1-1	C&P	AC:5F:3E:5B:73:6C	78Mbps...	117Mbps...	0	-67	01:45:15....	6 859/6 577	4751.6 KiB/1306....
kancelarije 2-1	C&P	84:38:38:DB:4B:C3	11Mbps	1Mbps	0	-86	00:10:19....	13/71	895 B/6.6 KiB
kancelarije 2-1	C&P	AC:5F:3E:67:EB:63	58.5Mbps...	52Mbps...	0	-66	00:07:27....	301/295	170.6 KiB/52.1 KiB
kancelarije 2-1	C&P	4C:66:41:0B:95:91	52Mbps...	26Mbps...	0	-88	00:04:55....	459/434	242.8 KiB/75.2 KiB
kancelarije 2-1	C&P	68:A3:C4:26:C3:10	135Mbps...	81Mbps...	0	-75	00:03:53....	402/567	113.6 KiB/198.4 ...
kancelarije 2-1	C&P	4C:BB:58:22:B5:13	1Mbps	1Mbps	0	-67	00:00:01....		
potirnica-1	C&P	1C:3E:84:1E:40:9E	1Mbps	1Mbps	0	-88	00:00:01....		
srednja komora 2-1	C&P	28:27:BF:88:72:A1	1Mbps	26Mbps...	0	-67	00:00:34....	2/2	186 B/445 B
srednja komora 2-1	C&P	00:17:23:AB:89:63	5.5Mbps	36Mbps	0	-72	00:00:14....	17/25	3636 B/6.4 KiB
vage-1	C&P	1C:67:58:5F:79:BD	26Mbps...	1Mbps	0	-85	04:22:19....	7 503/5 351	6.1 MiB/700.2 KiB
vage-1	C&P	F4:42:8F:85:E3:15	13Mbps...	1Mbps	0	-91	04:07:03....	1 249/1 390	287.6 KiB/178.3 ...
vage-1	C&P	18:21:95:AC:E1:E5	11Mbps	1Mbps	0	-89	00:35:42....	1 261/1 258	155.1 KiB/97.5 KiB
vage-1	C&P	6C:5F:1C:95:3A:0A	6.5Mbps...	1Mbps	0	-88	00:13:08....	70/73	11.7 KiB/9.1 KiB
vage-1	C&P	60:7E:DD:F5:E5:D8	1Mbps	1Mbps	0	-92	00:00:49....	0/2	0 B/514 B

RouterOS WinBox

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# Instalacija i kontrola

aristovic@192.168.1.35 (CAPsMAN\_Server) - WinBox v6.35.2 on RB3011UiAS (arm)

Session Settings Dashboard

Safe Mode Session: 192.168.1.35

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

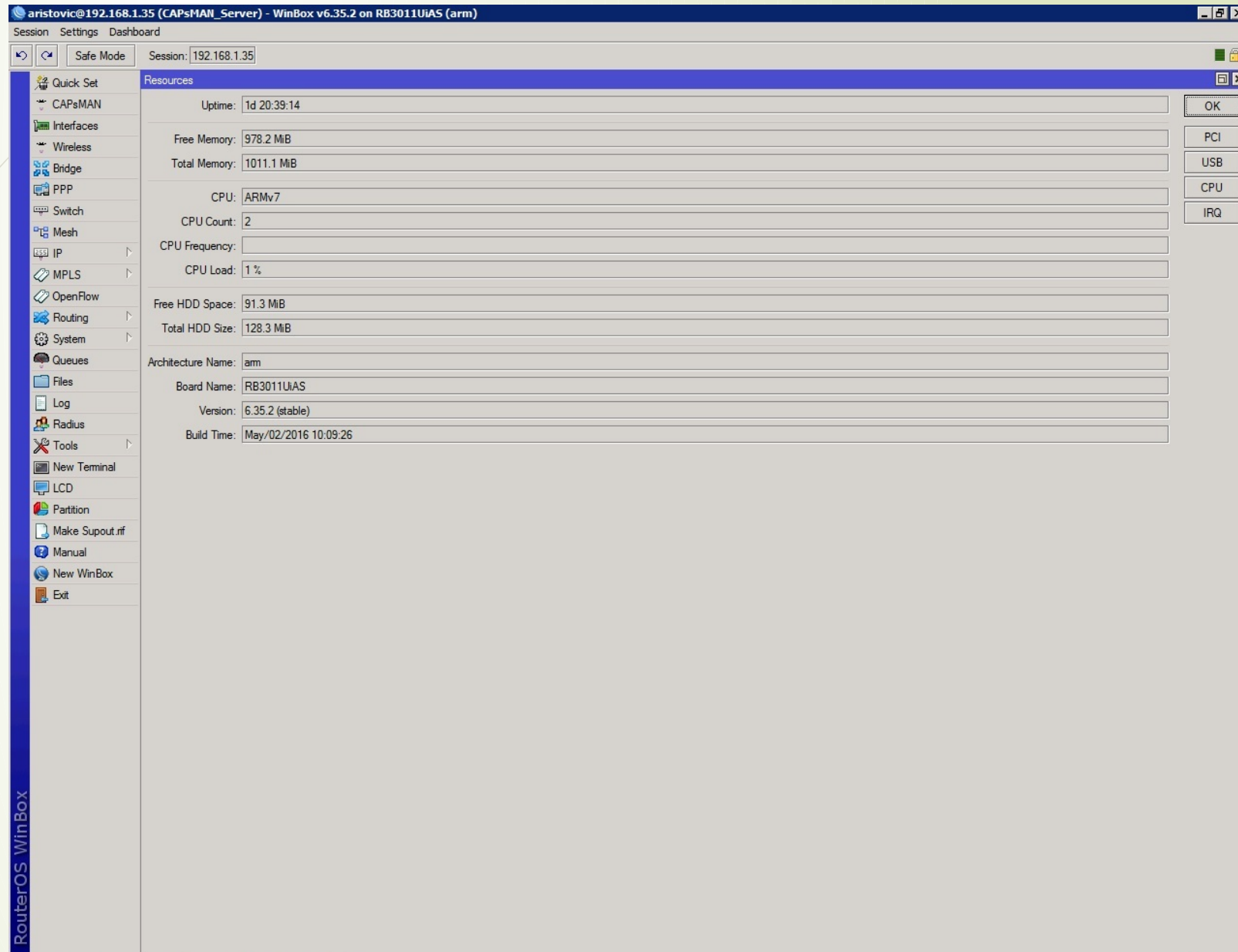
Interface List

Interface	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE								
Name	Type	L2 MTU	Tx	Fx	Tx Packet (p/s)	Fx Packet (p/s)	FP Tx	FP Rx	FP Tx Packet (p/s)	FP Rx P						
DSB ambalaza1-1	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB ambalaza2-1	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DRS bela proizvodn...	Interfaces	1600	1520 bps	0 bps	3	0	0 bps	0 bps	0	0						
R --bridge1	Bridge	1598	861.3 kbps	60.8 kbps	158	65	0 bps	59.6 kbps	0	0						
RS < >ether1	Ethernet	1598	924.2 kbps	658.9 kbps	189	122	884.7 kbps	651.4 kbps	184	122						
RS < >ether2	Ethernet	1598	2.1 kbps	0 bps	4	0	1944 bps	0 bps	4	4						
RS < >ether3	Ethernet	1598	2.1 kbps	0 bps	4	0	1944 bps	0 bps	4	4						
RS < >ether4	Ethernet	1598	2.1 kbps	0 bps	4	0	1944 bps	0 bps	4	4						
RS < >ether5	Ethernet	1598	4.4 kbps	512 bps	7	1	3.9 kbps	480 bps	7	7						
RS < >ether6	Ethernet	1598	15.8 kbps	2.4 kbps	10	2	7.1 kbps	4.4 kbps	11	11						
RS < >ether7	Ethernet	1598	16.3 kbps	5.4 kbps	10	4	3.2 kbps	736 bps	6	6						
RS < >ether8	Ethernet	1598	6.7 kbps	0 bps	4	0	1944 bps	0 bps	4	4						
RS < >ether9	Ethernet	1598	7.2 kbps	0 bps	5	0	1520 bps	0 bps	3	3						
S < >ether10	Ethernet	1598	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB juzna rampa-1	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB kancelarije 1-1	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DRS kancelarije 2-1	Interfaces	1600	598.0 kbps	31.8 kbps	64	38	0 bps	0 bps	0	0						
DSB magacin-1	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB mala komora-1	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB nova komora ...	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB nova komora ...	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB nova komora ...	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB nova komora ...	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DRS portimica-1	Interfaces	1600	1520 bps	0 bps	3	0	0 bps	0 bps	0	0						
DSB pothlada-1	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB sevema rampa-1	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
S < >sfp1	Ethernet	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DRS srednja komor...	Interfaces	1600	960 bps	560 bps	2	1	0 bps	0 bps	0	0						
DSB srednja komor...	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB srednja komor...	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB srednja komor...	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DSB vage-1	Interfaces	1600	0 bps	0 bps	0	0	0 bps	0 bps	0	0						
DRS zuta proizvodn...	Interfaces	1600	1520 bps	0 bps	3	0	0 bps	0 bps	0	0						

RouterOS WinBox

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# Instalacija i kontrola



The screenshot displays the RouterOS WinBox interface. The top status bar shows the user 'aristovic@192.168.1.35 (CAPsMAN\_Server)' and the device 'WinBox v6.35.2 on RB3011UiAS (arm)'. The main window is titled 'Resources' and displays various system metrics. On the left, a vertical menu lists various configuration options. On the right, there are buttons for 'OK', 'PCI', 'USB', 'CPU', and 'IRQ'. The system information is as follows:

Resource	Value
Uptime	1d 20:39:14
Free Memory	978.2 MiB
Total Memory	1011.1 MiB
CPU	ARMv7
CPU Count	2
CPU Frequency	
CPU Load	1 %
Free HDD Space	91.3 MiB
Total HDD Size	128.3 MiB
Architecture Name	arm
Board Name	RB3011UiAS
Version	6.35.2 (stable)
Build Time	May/02/2016 10:09:26

# Instalacija i kontrola

The screenshot shows the WinBox interface for CAPsMAN configuration. The main window displays a table of configurations with two entries selected. Two modal windows are open, showing configuration details for the selected entries.

**Table of Configurations:**

#	Radio MAC	Identity Regexp	Common Nam...	Action	Master Configurati...	Slave Configuration
0	E4:8D:8C:76:CB:AA			create dy...	cfg2	
1	00:00:00:00:00:00			create dy...	cfg1	

**Modal Window 1: CAPs Provisioning <00:00:00:00:00:00>**

Radio MAC: 00:00:00:00:00:00  
Hw. Supported Modes: [dropdown]  
Identity Regexp: [text]  
Common Name Regexp: [text]  
IP Address Ranges: [dropdown]  
Action: create dynamic enabled  
Master Configuration: cfg1  
Slave Configuration: [dropdown]  
Name Format: prefix identity  
Name Prefix: [dropdown]

**Modal Window 2: CAPs Provisioning <E4:8D:8C:76:CB:AA>**

Radio MAC: E4:8D:8C:76:CB:AA  
Hw. Supported Modes: [dropdown]  
Identity Regexp: [text]  
Common Name Regexp: [text]  
IP Address Ranges: [dropdown]  
Action: create dynamic enabled  
Master Configuration: cfg2  
Slave Configuration: [dropdown]  
Name Format: prefix identity  
Name Prefix: [dropdown]

# Instalacija i kontrola

admin@192.168.1.35 (CAPsMAN server) - WinBox v6.36.3 on RB3011UiAS (arm)

Session Settings Dashboard

Safe Mode Session: 192.168.1.35

RouterOS WinBox

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

CAPsMAN

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

Name	SSID	Hide SSID	Load Bal...	Country	Channel	Frequency	Band	Rate	Datapath	Bridge	VLAN
cfg1	C&P			serbia			2ghz-b/g/n			bridge1	
cfg2	C&P			serbia			5ghz-a/n/ac			bridge1	

CAPs Configuration <cfg1>

Wireless Channel Rates Datapath Security

Channel:

Frequency:

Width:

Band: 2ghz-b/g/n

Extension Channel:

Tx. Power:

OK  
Cancel  
Apply  
Comment  
Copy  
Remove

CAPs Configuration <cfg2>

Wireless Channel Rates Datapath Security

Channel:

Frequency:

Width:

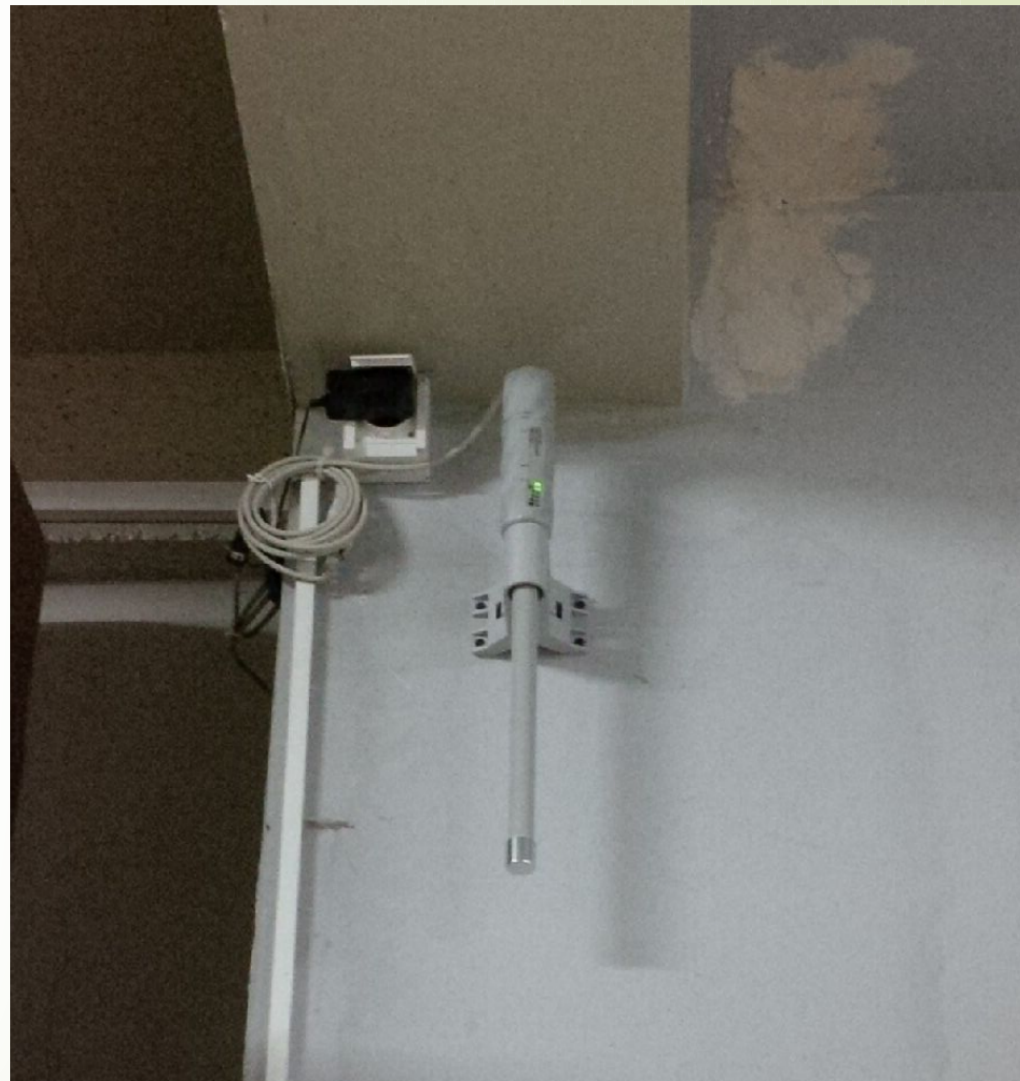
Band: 5ghz-a/n/ac

Extension Channel:

Tx. Power:

OK  
Cancel  
Apply  
Comment  
Copy  
Remove

# Praktični primeri naših instalacija



# Praktični primeri naših instalacija



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# Praktični primeri naših instalacija



# Praktični primeri naših instalacija





# Problemi u praktičnom radu i eksploataciji

- ▣ Nekompatibilnost CAPsMAN V1 i CAPsMAN V2
- ▣ Zatvoren prostor sa metalnim rafovima
- ▣ Korišćenje dva banda 2.4 i 5.8 Ghz
- ▣ Preveliki broj uređaja velike snage prave sami sebi smetnju
- ▣ Jačina signala (signal osciluje)-ne primećuje se u praktičnom radu
- ▣ Što jednostavnija podešavanja to bolje radi u praktičnom radu, ograničavanja u access listi ili queues dosta usporava mrežu. Stvara se utisak kao da mreža pulsira u radu...
- ▣ Ne prebacuje korisnike sa jednog na drugi ap iako je signal loš -75 dbi( na jačini signala -75 dbi korisnik izvlači maksimalnu brzinu)



# Korisni linkovi

- <http://wiki.mikrotik.com/wiki/Manual:CAPsMAN>
- <https://www.youtube.com/watch?v=KVxAj8EXRCo>
- <https://www.youtube.com/watch?v=nOO8K9gGulc>
- <https://www.youtube.com/watch?v=Q9h00PYEzQM>

# Pitanja & Odgovori

