



Centralizovana kontrola bežične mreže uz korišćenje Mikrotik CAPsMAN V2

MUM Beograd, 10.10.2016. godine

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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**



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

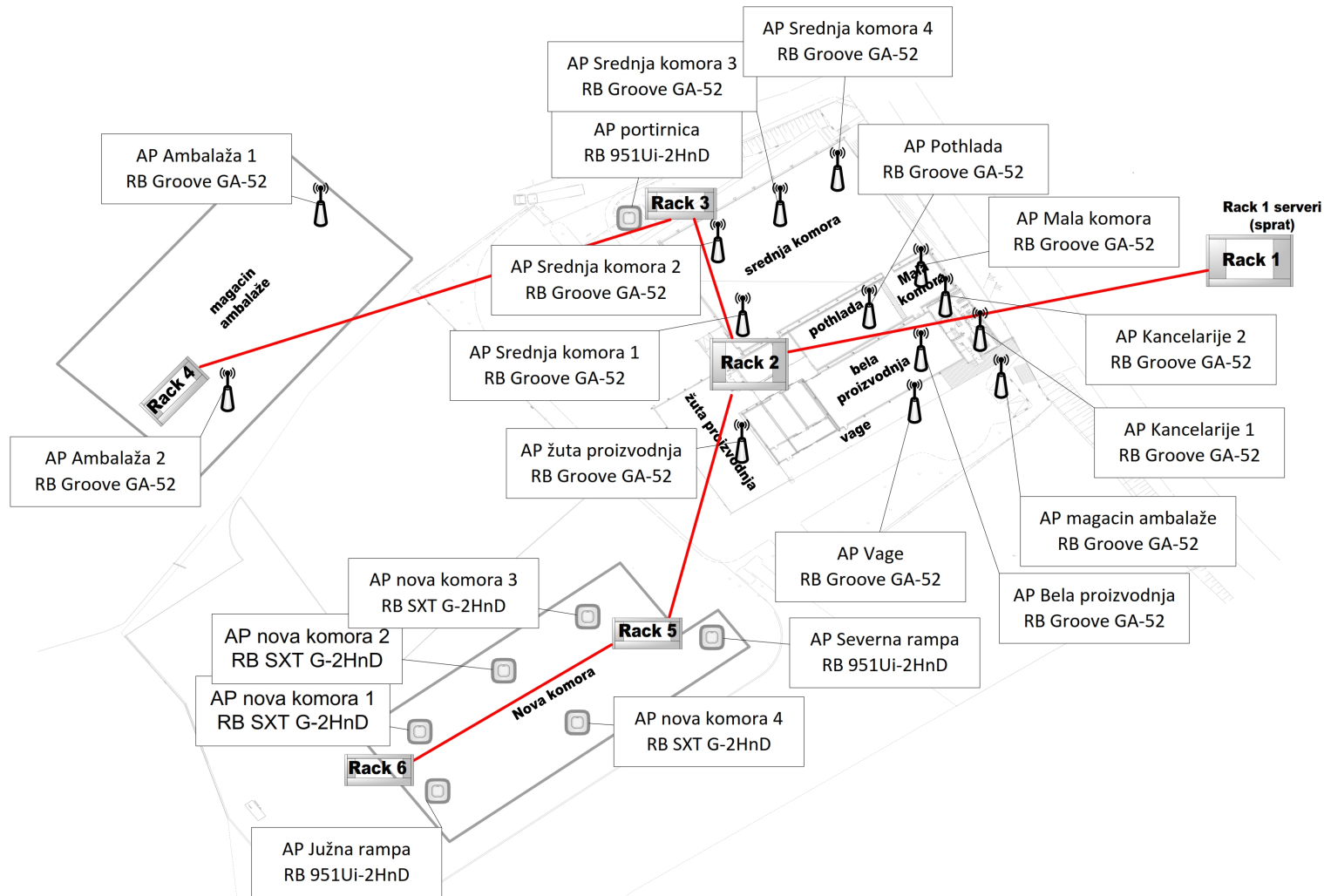
- ▣ Minimalno vreme neophodno za instalaciju
- ▣ Jednostavno podešavanje
- ▣ Preglednost statistike o mreži
- ▣ Velika pouzdanost
- ▣ Ne zahteva posebno održavanje
- ▣ **Veoma povoljno rešenje!!!**



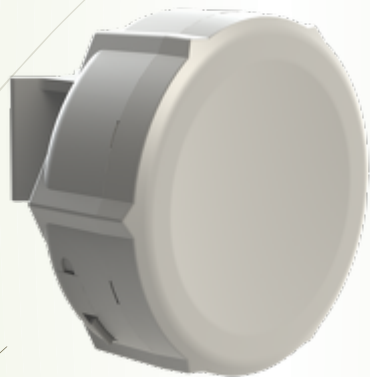
Zahtev korisnika

- ▮ Površina objekata 2500 m²
- ▮ 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

WinBox v3.4 (Addresses)

File Tools

Connect To: 192.168.1.25 ☒ Keep Password
Login: ☐ Open In New Window
Password:

Add/Set Connect To RoMON Connect

Managed Neighbors

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

RouterOS WinBox

CAPsMAN

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

Manager AAA

Find

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

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-2HnD r2	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:B6:98:46	[4C:5E:0C:B6:98:46]	RB951Ui-2HnD	4AC704FD760E	6.33	sevema rampa	4C:5E:0C:B6:98:46	Run	1
E4:8D:8C:62:8C:9C	[E4:8D:8C:62:8C:9C]	RB SXT G-2HnD r2	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-2HnD r2	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-2HnD r2	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-2HnD r2	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

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

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

RouterOS WinBox

21 items (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

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...	19.5Mbps...	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		0	-67	00:00:01....		
portirnica-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

18 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

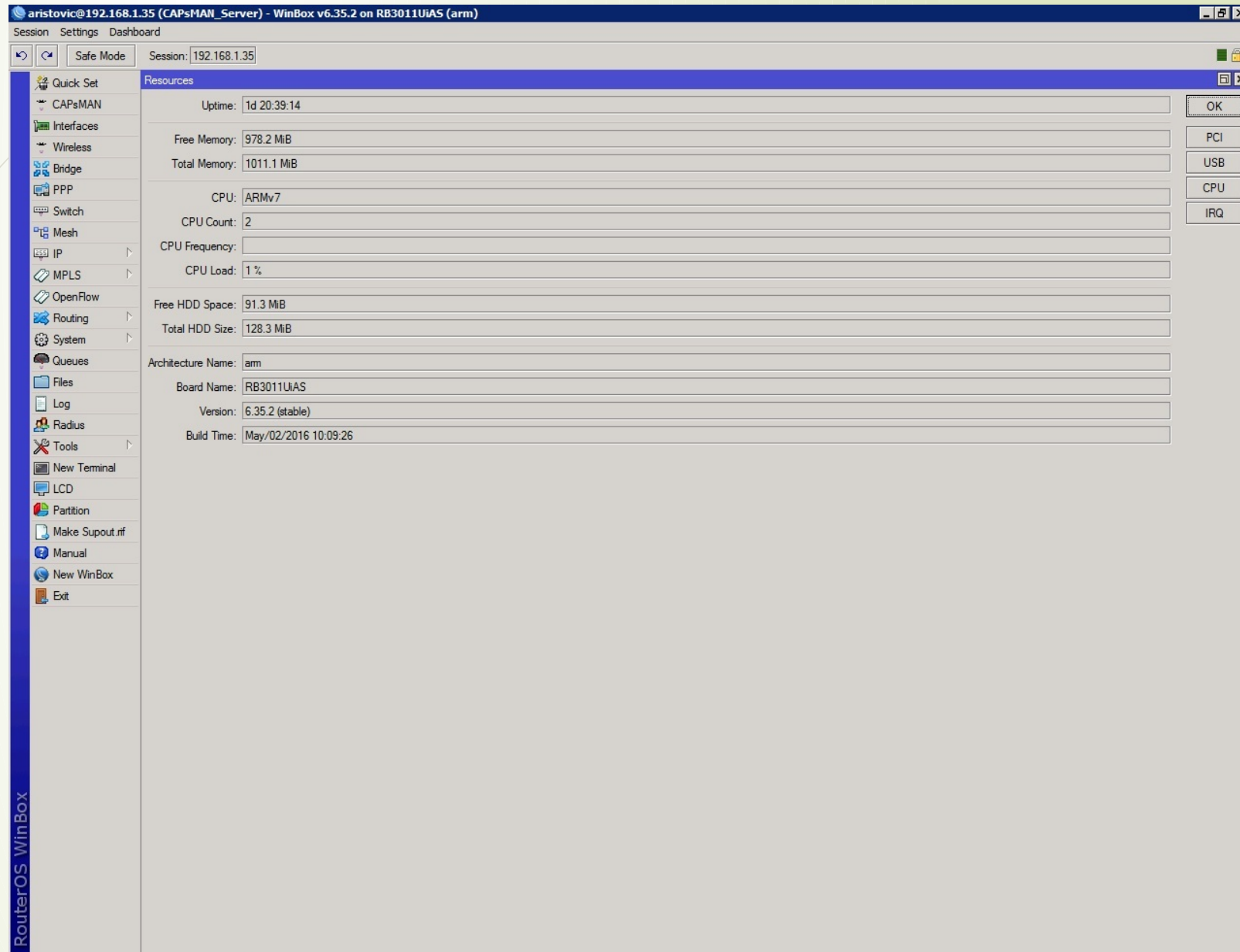
Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP MPLS OpenFlow Routing System Queues Files Log Radius Tools New Terminal LCD Partition Make Supout.rf Manual New WinBox Exit

Interface List

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

33 items

Instalacija i kontrola



The image displays the RouterOS WinBox web interface. The top status bar shows the user 'aristovic@192.168.1.35 (CAPsMAN_Server)' and the version 'WinBox v6.35.2 on RB3011UiAS (arm)'. Below this, there are tabs for 'Session', 'Settings', and 'Dashboard'. The 'Session' tab is active, showing 'Safe Mode' and 'Session: 192.168.1.35'. A left sidebar contains a menu with icons and labels for various system functions: 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.rtf, Manual, New WinBox, and Exit. The main content area is titled 'Resources' and displays system statistics in a table-like format. On the right side of the Resources section, there are buttons for 'OK', 'PCI', 'USB', 'CPU', and 'IRQ'. The system information shown includes:

Resources	
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

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

#	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	

CAPs Provisioning <00:00:00:00:00:00>

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

Hw. Supported Modes:

Identity Regexp:

Common Name Regexp:

IP Address Ranges:

Action: create dynamic enabled

Master Configuration: cfg1

Slave Configuration:

Name Format: prefix identity

Name Prefix:

OK Cancel Apply Disable Comment Copy Remove

2 items (1 selected) enabled

CAPs Provisioning <E4:8D:8C:76:CB:AA>

Radio MAC: E4:8D:8C:76:CB:AA

Hw. Supported Modes:

Identity Regexp:

Common Name Regexp:

IP Address Ranges:

Action: create dynamic enabled

Master Configuration: cfg2

Slave Configuration:

Name Format: prefix identity

Name Prefix:

OK Cancel Apply Disable Comment Copy Remove

enabled

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



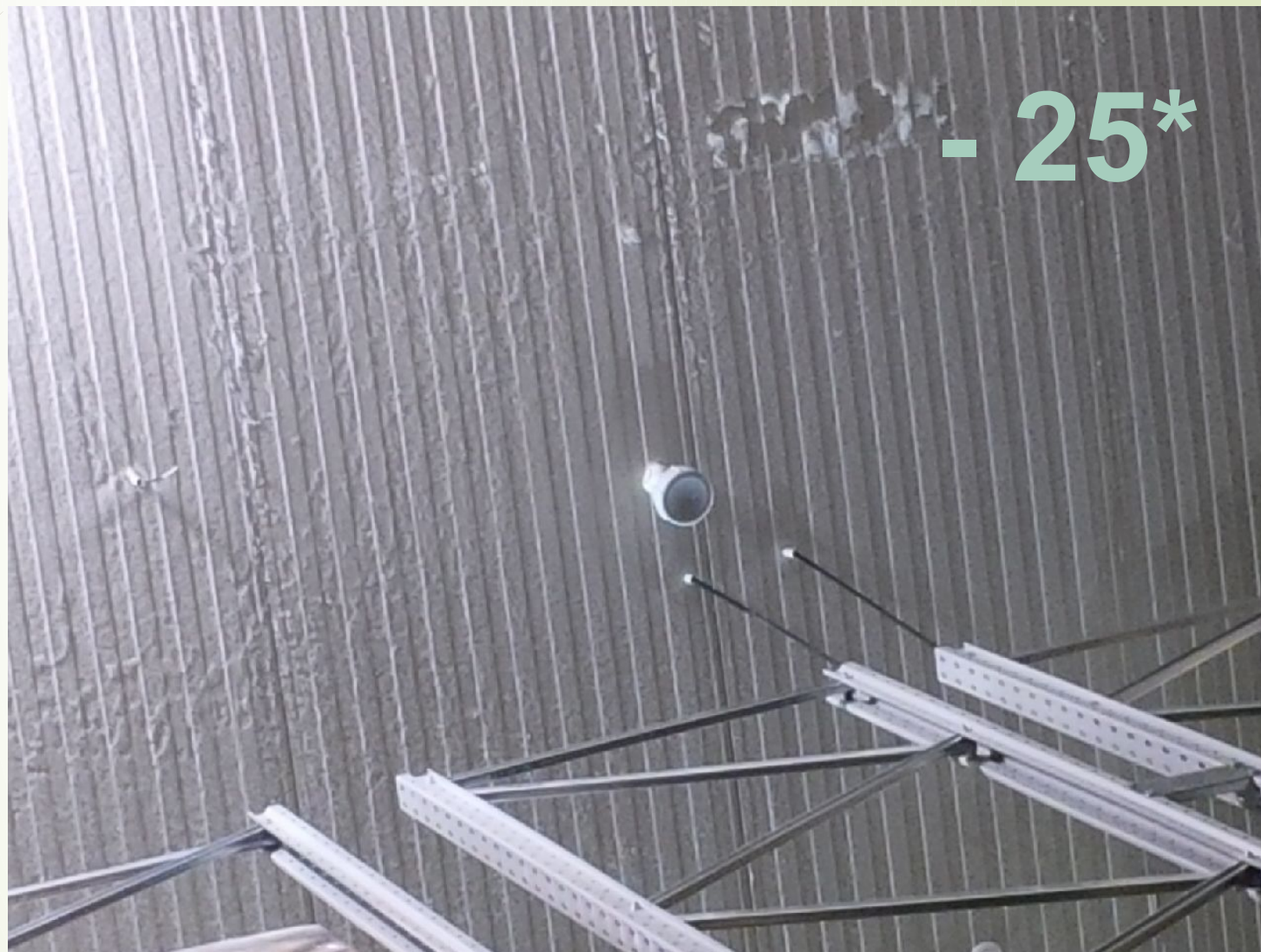
Praktični primeri naših instalacija



Praktični primeri naših instalacija



Praktični primeri naših instalacija



Praktični primeri naših instalacija



Praktični primeri naših instalacija





Problemi u praktičnom radu i eksplotaciji

- ❑ 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

