

CAPsMAN - контроллер Wi-Fi сети





MIKROTIK NINJA

ИНТЕГРАЦИЯ • НАСТРОЙКА • ОБУЧЕНИЕ

**Бубнов
Дмитрий**



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/bubnovdnet



bubnovd.net

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/event137391313



/groups/sysadminka/



/sysadminka



sysadminka.org

О чем будем говорить

- Немного теории Wi-Fi
- Разные подходы к построению сетей
- Контроллер Wi-Fi на Mikrotik - CAPsMAN
- Примеры из жизни



Немного теории

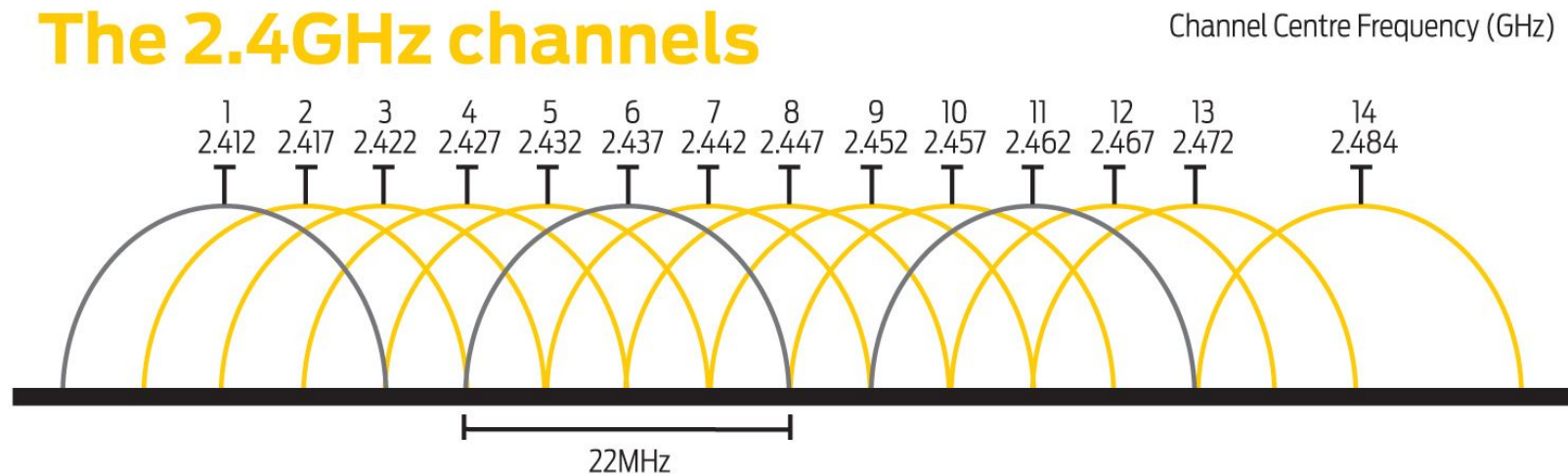
802.11 standard evolution

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
Typical Range Indoors*	100 ft.	100 ft.	125 ft.	225 ft.	90 ft.
Typical Range Outdoors*	400 ft.	450 ft.	450 ft.	825 ft.	1,000 ft.



Немного теории

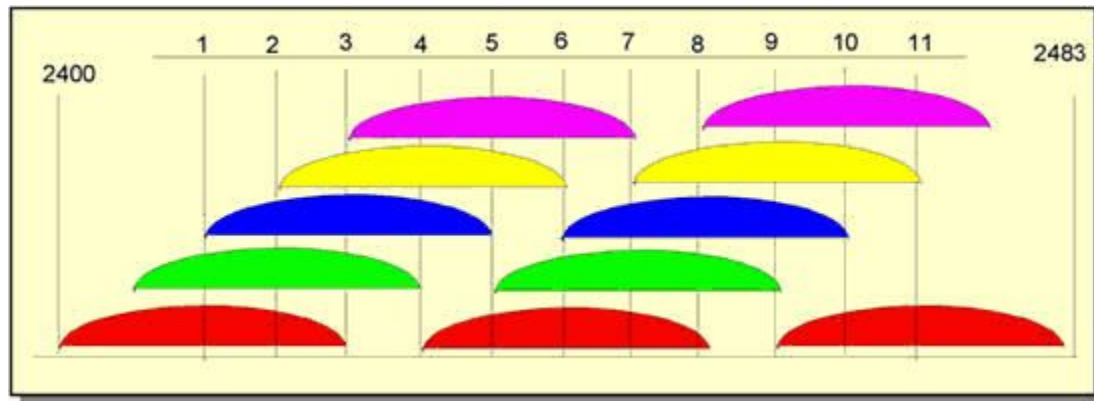
The 2.4GHz channels



The 2.4GHz channels contain a vast amount of overlap, which is why some routers only allow you to choose from channels 1, 6 and 11. The use of channel 14 isn't permitted in much of the world, including Australia.

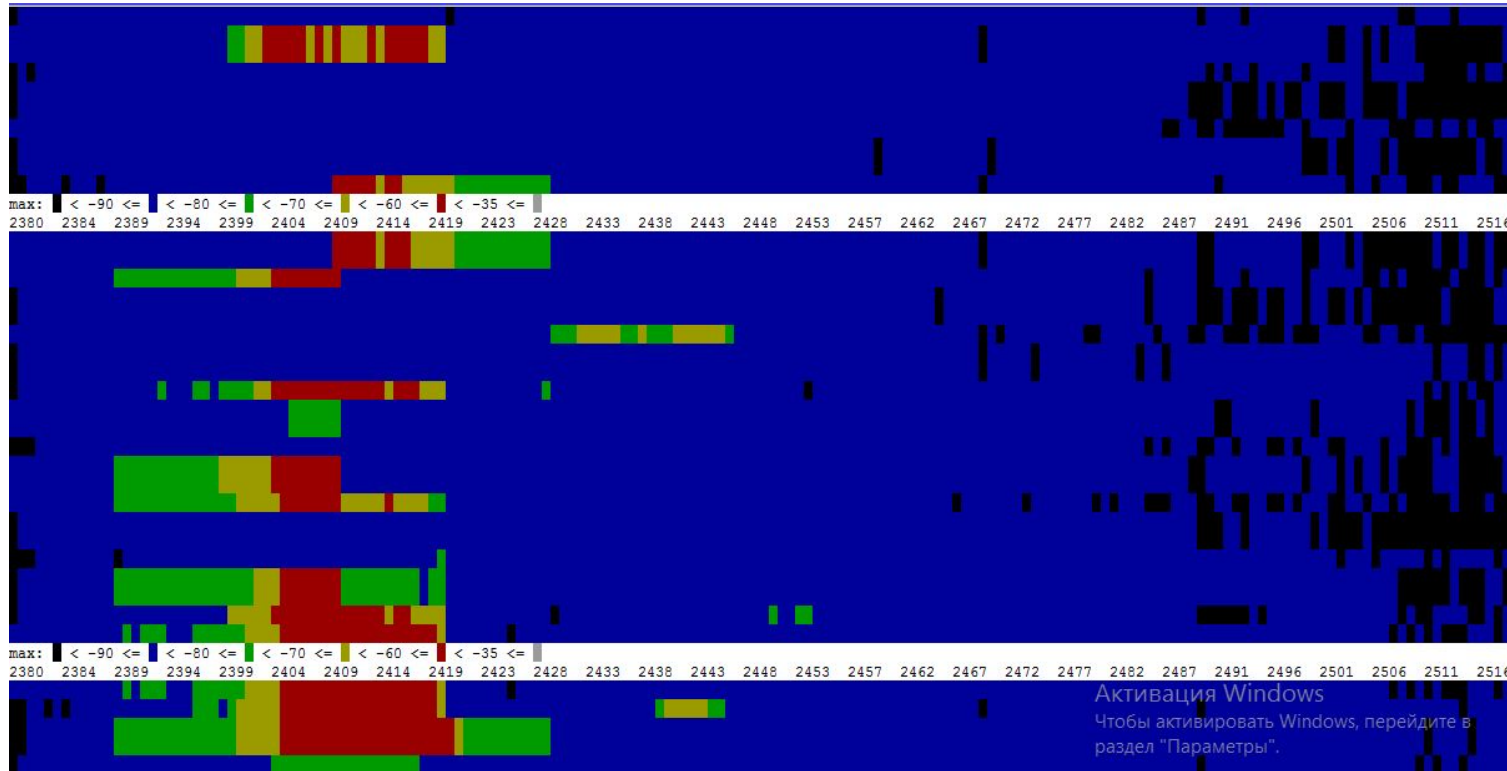


Немного теории

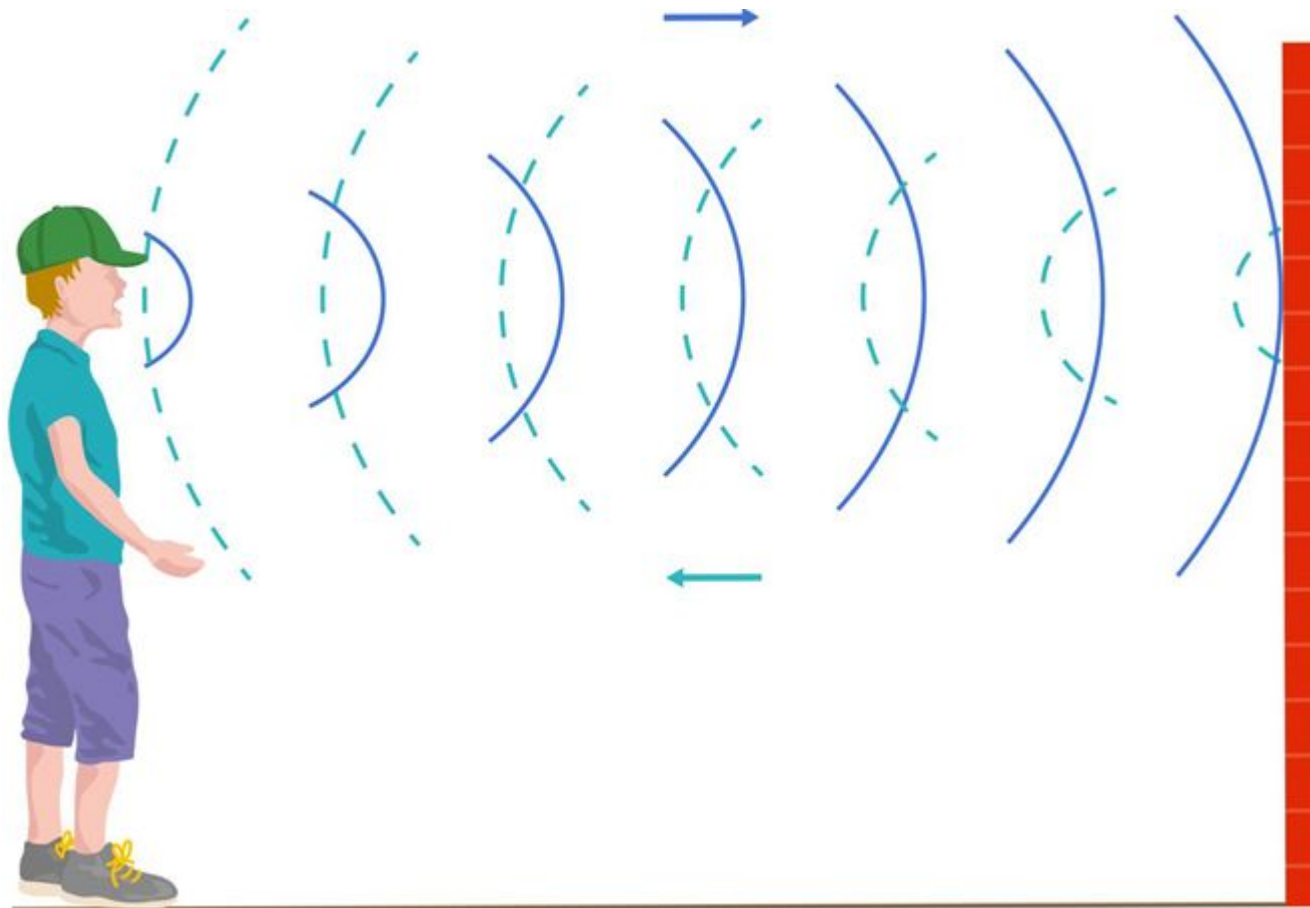


Спектральный анализ

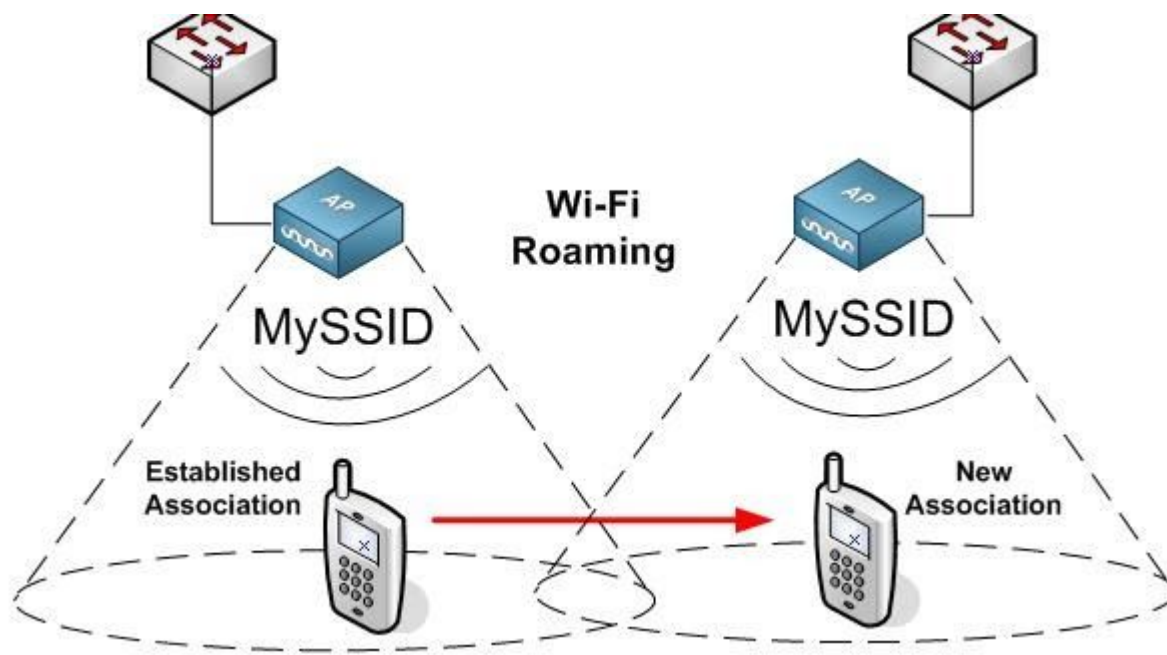
/interface wireless spectral-history wlan1



Немного теории



Роуминг



Вредные советы

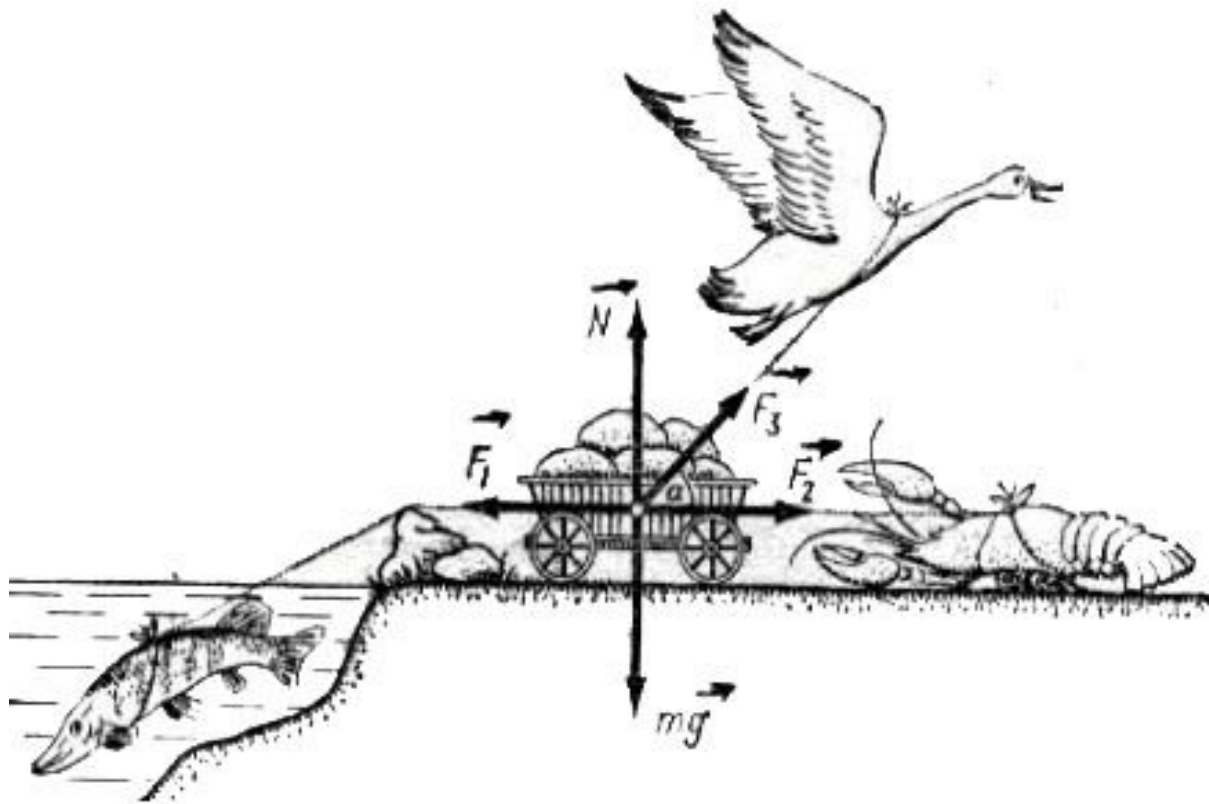
- Частоту ставим auto - точка сама знает, что выбрать
- Ширину канала на максимум - больше данных пролезет
- Мощность передатчика побольше - лучше будет сигнал



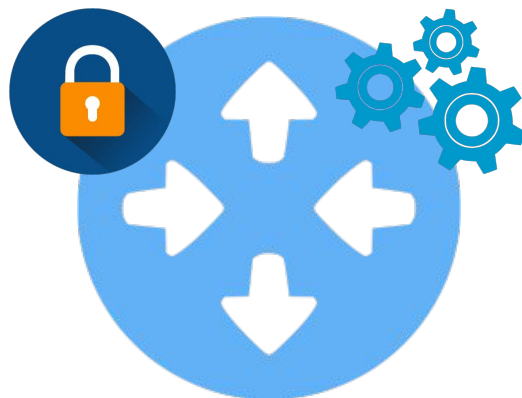
Автономные точки доступа



Автономные точки доступа



Точки доступа и контроллер



Конфигурируемые точки доступа и контроллер



Mikrotik. CAPsMAN

- Подключить новую точку доступа сможет даже твоя бабушка
- Точка даже обновит свою прошивку
- Несколько SSID с разделением по VLAN
- Автовыбор идеальных частот



Mikrotik. CAPsMAN

The screenshot displays the Mikrotik WinBox CAPsMAN interface. The main window shows a list of 16 CAP interfaces. A 'CAPs Manager' dialog box is open in the foreground, allowing configuration of CAPs Manager settings.

Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)
MI CAP-RB011-U...	CAP Interface	1500		1600		0 bps	0 bps	0
I CAP-RB01...	CAP Interface	1500				0 bps	0 bps	0
MI CAP-RB021-U...	CAP Interface	1500		1600		0 bps	0 bps	0
I CAP-RB02...	CAP Interface					0 bps	0 bps	0
MI CAP-RB022-U...	CAP Interface					0 bps	0 bps	0
I CAP-RB02...	CAP Interface					0 bps	0 bps	0
MI CAP-RB031-U...	CAP Interface					0 bps	0 bps	0
I CAP-RB03...	CAP Interface					0 bps	0 bps	0
MI CAP-RB041-U...	CAP Interface					0 bps	0 bps	0
I CAP-RB04...	CAP Interface					0 bps	0 bps	0
MI CAP-RB042-U...	CAP Interface					0 bps	0 bps	0
I CAP-RB04...	CAP Interface					0 bps	0 bps	0
MI CAP-RB043-U...	CAP Interface					0 bps	0 bps	0
I CAP-RB04...	CAP Interface					0 bps	0 bps	0

CAPs Manager configuration dialog:

- Enabled
- Certificate: [Dropdown]
- CA Certificate: [Dropdown]
- Require Peer Certificate
- Generated Certificate: [Text Field]
- Generated CA Certificate: [Text Field]
- Package Path: /disk1/pkg
- Upgrade Policy: require same version (selected), none, require same version, suggest same version



CAPsMAN. Channels

CAPsMAN

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

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Name	Frequency	Control Channel ...	Band	Extension Channel	Tx Power
CH1-20-n	2412	20Mhz	2ghz-onlyn		15
CH6-20-n	2437	20Mhz	2ghz-onlyn		15
CH11-20-n	2462	20Mhz	2ghz-onlyn		15

3 items (1 selected)

CAPs Channel <CH1-20-n>

Name: CH1-20-n

Frequency: 2412

Control Channel Width: 20Mhz

Band: 2ghz-onlyn

Extension Channel:

Tx Power: 15

Save Selected:

Reselect Interval:

Skip DFS Channels:

OK
Cancel
Apply
Comment
Copy
Remove



CAPsMAN. Security

The screenshot displays the Mikrotik CAPsMAN Security Configuration interface. At the top, there are tabs for 'Interfaces', 'Provisioning', 'Configurations', 'Channels', 'Datapaths', 'Security Cfg.', 'Access List', 'Rates', 'Remote CAP', and 'Radi'. Below the tabs are icons for adding, deleting, and filtering configurations. A table lists the configurations, with 'security26' selected. A dialog box titled 'CAPs Security Configuration <security26>' is open, showing the configuration details for the selected item.

Name	Authentication T...	Encryption	Group Encryption	Passphrase	EAP Methods
guest	WPA2 PSK	aes ccm	aes ccm	*****	
security26	WPA2 PSK	aes ccm	aes ccm	*****	
security27	WPA2 PSK	aes ccm	aes ccm	*****	

CAPs Security Configuration <security26>

Name: security26

Authentication Typ: WPA PSK WPA2 PSK WPA EAP WPA2 EAP ▲

Encryption: aes ccm tkip ▲

Group Encryption: aes ccm ▼ ▲

Passphrase: ***** ▲

EAP Methods: ▼ ▲

EAP Radius Accountin: ▼

TLS Mode: ▼

TLS Certificati: ▼

Buttons: OK, Cancel, Apply, Comment, Copy, Remove

3 items (1 selected)



CAPsMAN. Datapath

The screenshot displays the CAPsMAN configuration interface. At the top, there are tabs for 'Interfaces', 'Provisioning', 'Configurations', 'Channel', 'Datapaths', 'Security Cfg.', and 'Access'. Below the tabs is a toolbar with icons for adding, deleting, saving, and filtering. A table lists existing datapaths:

Name	Bridge	Local Forwarding	Client To...	VLAN Mode	VLA
datapath101		yes		use tag	
datapath3100		yes		use tag	

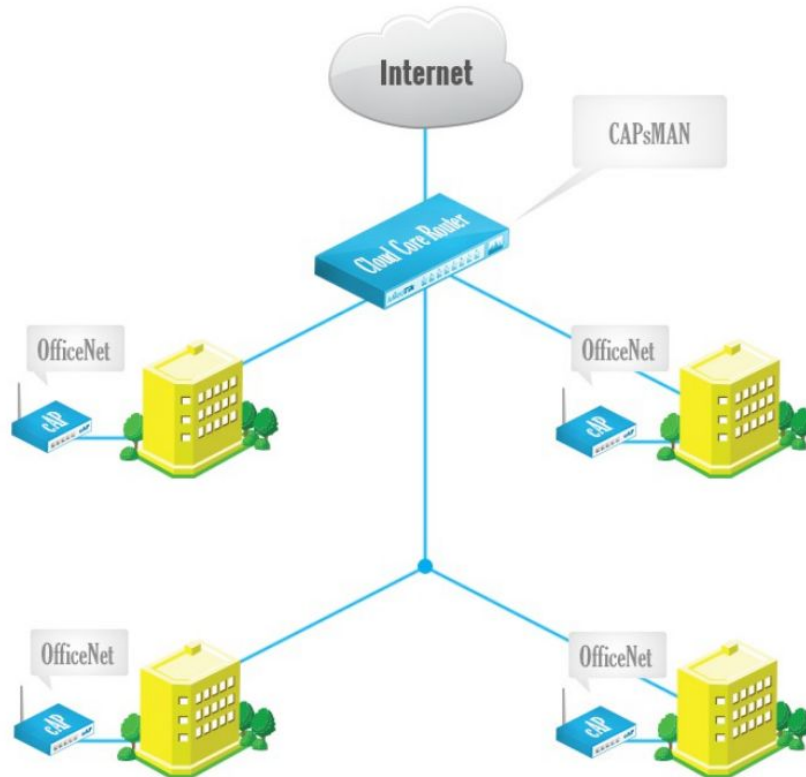
Below the table is a 'New CAPs Datapath Configuration' dialog box. The fields are as follows:

- Name: datapath1
- MTU: [dropdown]
- L2 MTU: [dropdown]
- ARP: [dropdown]
- Bridge: bridge12
- Bridge Cost: [dropdown]
- Bridge Horizor: [dropdown]
- Local Forwardin: [dropdown]
- Client To Client Forwardir: [dropdown]
- VLAN Mode: [dropdown]
- VLAN ID: [dropdown]

Buttons on the right side of the dialog include: OK, Cancel, Apply, Comment, Copy, and Remove.



CAPsMAN. Datapath



CAPsMAN. Datapath. Local Forwarding

The screenshot displays the CAPsMAN configuration window in WinBox. The 'Datapaths' tab is active, showing a table of configured datapaths. A configuration dialog for 'datapath101' is open, showing various settings.

Name	Bridge	Local Forwarding	Client To...	VLAN Mode	VLAN ID
datapath101		yes		use tag	101
datapath3100		yes		use tag	3100

Name	datapath101	OK
MTU		Cancel
L2 MTU		Apply
ARP		Comment
Bridge		Copy
Bridge Cost		Remove
Bridge Horizor		
Local Forwarding	<input checked="" type="checkbox"/>	
Client To Client Forwarding		
VLAN Mode	use tag	
VLAN ID	101	



CAPsMAN. Configuration

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 Mode	VLAN ID	Security
guest	guest			russia					datapath101				guest
ud26	ud26			russia					datapath3100				security26
ud27	ud27			russia					datapath3100				security27

CAPs Configuration <guest>

Wireless Channel Rates Datapath Security

Name: guest
Mode:
SSID: guest
Hide SSID:
Load Balancing Gro:
Distance:
Hw. Retries:
Hw. Protection Mode:
Frame Lifetim:
Disconnect Timeou:
Country: russia
Max Station Coun:
Multicast Helpe:
HT Tx Chain:
HT Rx Chains:
HT Guard Interva:

New CAPs Configuration

Wireless Channel Rates Datapath Security

Datapath: datapath101
MTU:
L2 MTU:
ARP:
Bridge:
Bridge Cost:
Bridge Horizor:
Local Forwardin:
Client To Client Forwardir:
VLAN Mode:
VLAN ID:

New CAPs Configuration

Wireless Channel Rates Datapath Security

Security: guest
Authentication Typ:
Encryption:
Group Encryption:
Passphrase:
EAP Methods:
EAP Radius Accountin:
TLS Mode:
TLS Certificat:

OK
Cancel
Apply
Comment
Copy
Remove



CAPsMAN. Provisioning

The screenshot displays the CAPsMAN Provisioning interface. At the top, there are tabs for 'Interfaces', 'Provisioning', 'Configurations', 'Channels', 'Datapaths', 'Security Cfg.', 'Access List', 'Rates', 'Remote CAP', 'Radio', and 'Registration Table'. Below the tabs is a toolbar with icons for adding, deleting, saving, and refreshing. A table below shows a single entry with the following details:

#	Radio MAC	Identity Reg...	Common Na...	Action	Master Configura..	Slave Configuration
0	00:00:00:00:00:00			create di..	ud27	ud26, guest

A configuration dialog titled 'CAPs Provisioning <00:00:00:00:00:00>' is open, showing the following fields and options:

- Radio MAC: 00:00:00:00:00:00
- Hw. Supported Modes: (dropdown)
- Identity Regexp: (text input)
- Common Name Regexp: (text input)
- IP Address Range: (dropdown)
- Action: create disabled (dropdown menu is open, showing options: create disabled, create dynamic enabled, create enabled, none)
- Master Configuration: ud27 (dropdown)
- Slave Configuration: ud26, guest (dropdown)
- Name Format: prefix identity (dropdown)
- Name Prefix: CAP (text input)

Buttons on the right side of the dialog include OK, Cancel, Apply, Disable, Comment, Copy, and Remove. The 'enabled' checkbox at the bottom left is checked.



CAPsMAN. Access List

The screenshot displays the Mikrotik CAPsMAN interface for configuring an Access List. The main window shows a table with the following data:

#	MAC Address	MAC Mask	Interface	Signal Ra..	Action	Client To Clie..	VLAN Mode	VLAN ID
0				-75..-35	accept			
1					reject			

The 'CAPs Access Rule <->' dialog box is open, showing the configuration for the selected rule. The fields are as follows:

- MAC Address: [Empty]
- MAC Mask: [Empty]
- Interface: [Empty]
- SSID Regexp: [Empty]
- Signal Range: -75..-35
- Time: [Expanded]
- Action: accept
- AP Tx Limit: [Empty]
- Client Tx Limi: [Empty]
- Private Passphrase: [Empty]
- Client To Client Forwardir: [Empty]
- RADIUS Accounting: [Empty]
- VLAN Mode: [Empty]
- VLAN ID: [Empty]

Buttons on the right side of the dialog include: OK, Cancel, Apply, Disable, Comment, Copy, and Remove. The status at the bottom of the dialog is 'enabled'.



CAPsMAN. Provisioning

CAPsMAN

CAP Interface Provisioning Configurations Channels Datapaths Security Cfg. Access List Rates ...

#	Radio MAC	Hw. Supported Modes	Identity Regexp	Action	Master Configuration
0	00:00:00:00:00:00	g	-2.4CH01	create dynamic enabled	2.4GHz CH1
1	00:00:00:00:00:00	g	-2.4CH11	create dynamic enabled	2.4GHz CH11
2	00:00:00:00:00:00	g	-2.4CH06	create dynamic enabled	2.4GHz CH6
3	00:00:00:00:00:00			none	Missing

4 items

CAPsMAN

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

Name	SSID	Country	Channel	Frequency	Rate	Datapath	Sec
2.4GHz CH1	FMS	germany	2.4GHz Standard	2412MHz	StandardRates	ToCAPsBridge	WPA2
2.4GHz CH11	FMS	germany	2.4GHz Standard	2462MHz	StandardRates	ToCAPsBridge	WPA2
2.4GHz CH6	FMS	germany	2.4GHz Standard	2437MHz	StandardRates	ToCAPsBridge	WPA2
Missing							

4 items

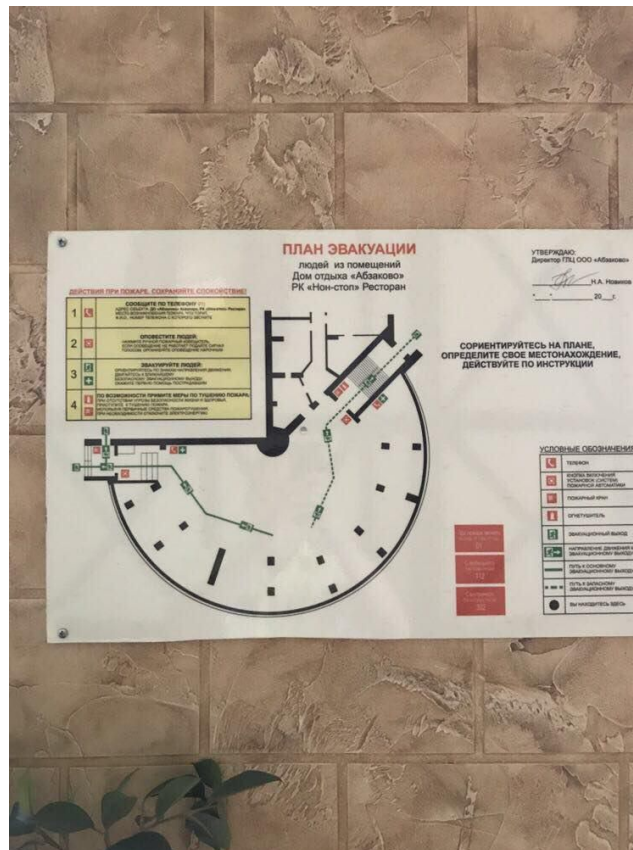
CAPsMAN

Configurations Channels Datapaths Security Cfg. Access List Rates Remote CAP Radio ...

Name	Frequency	Width	Band	Extension Channel	Tx Power
2.4GHz Standard		20MHz	2ghz-g/n	disabled	



Wi-Fi planners

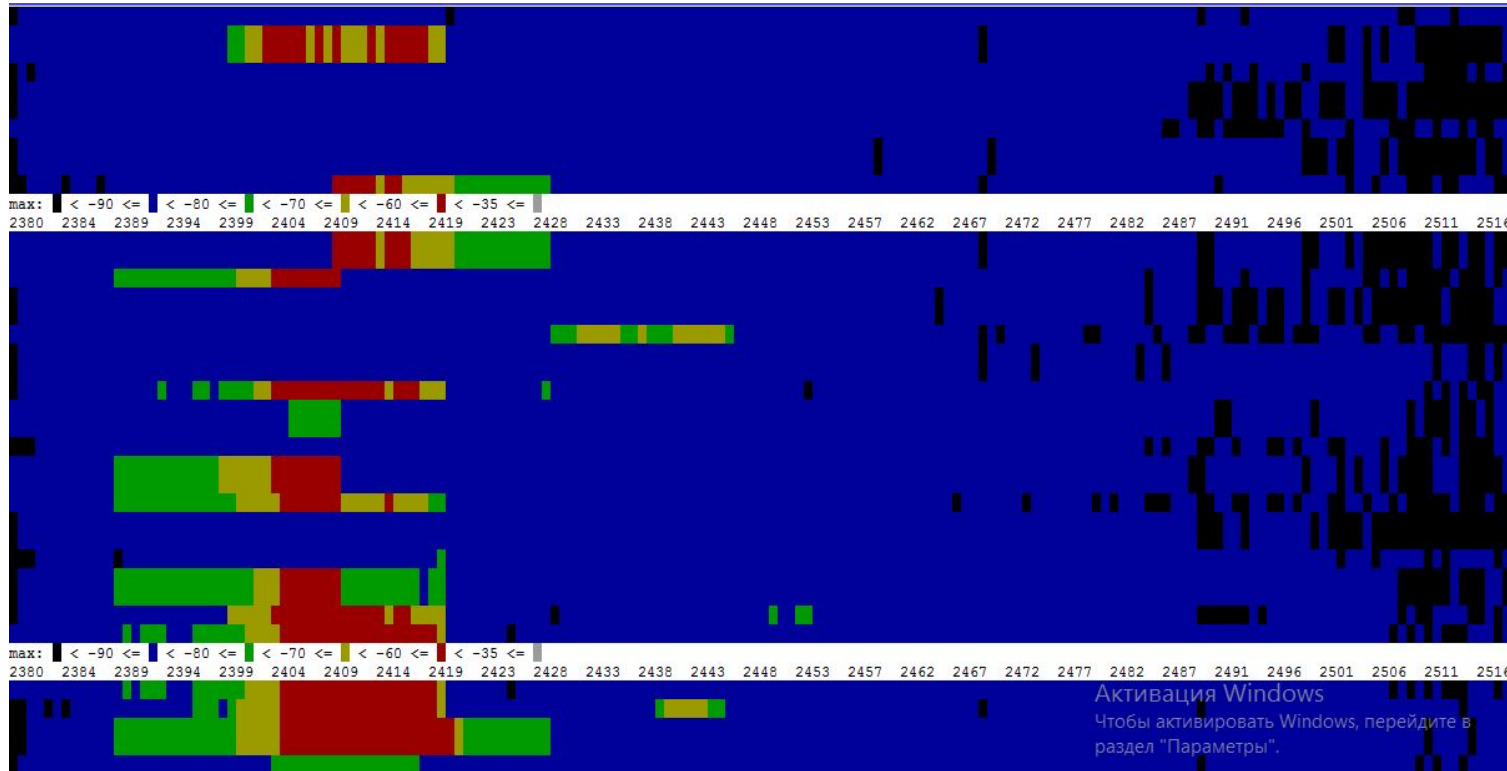


Wi-Fi planners: Ekahau, Tamograph, ...

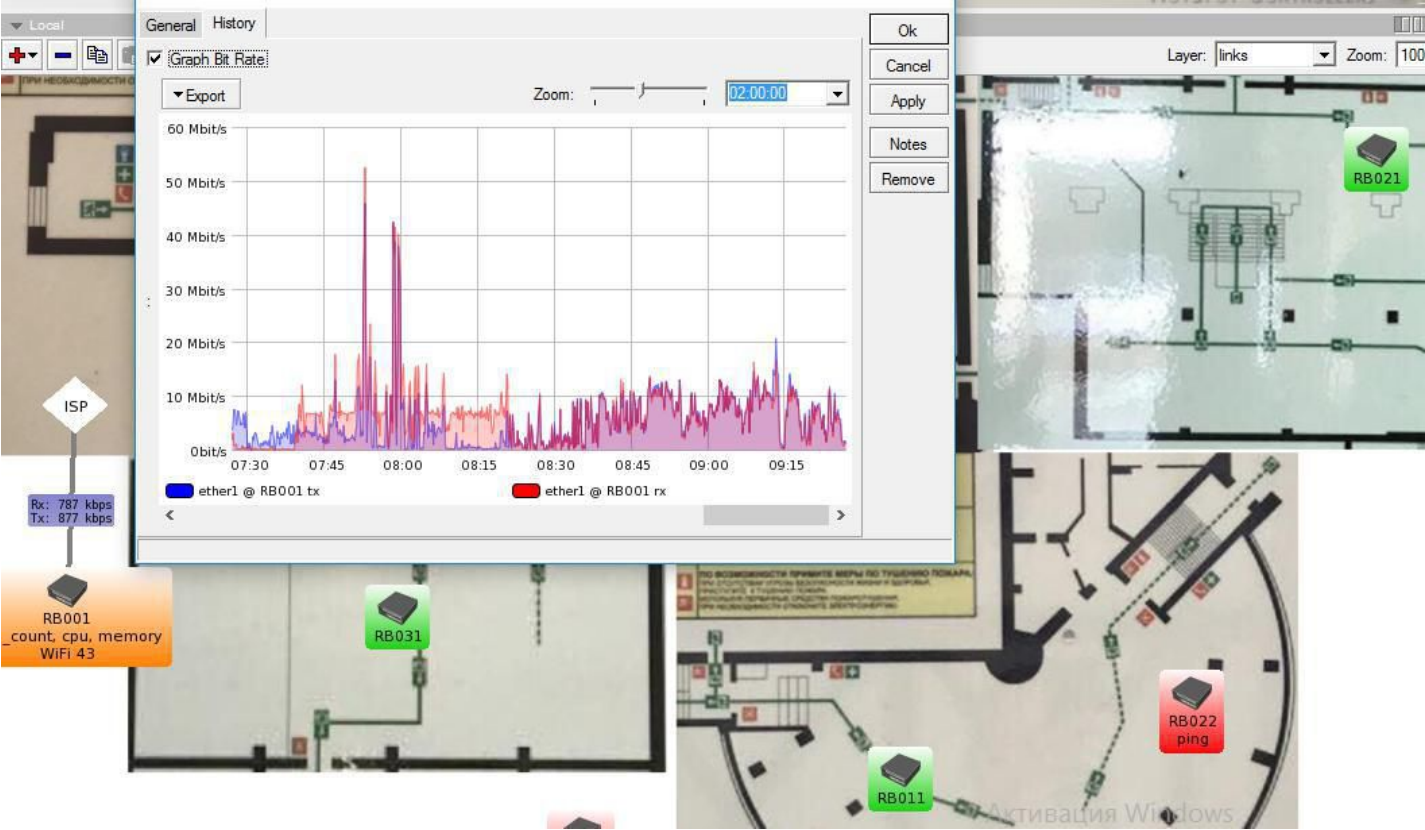


Спектральный анализ

/interface wireless spectral-history wlan1



Мониторинг



Где об этом почитать

- <https://sysadminka.org/?p=105>
- <https://mum.mikrotik.com/presentations/BR14/Uldis.pdf>
- https://mum.mikrotik.com/presentations/EU17/presentation_4059_1492080639.pdf





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