

CAPsMAN - контроллер Wi-Fi сети





MIKROTIK NINJA

ИНТЕГРАЦИЯ • НАСТРОЙКА • ОБУЧЕНИЕ

**Бубнов
Дмитрий**



/bubnovd



/bubnovdnet



/bubnovdnet



bubnovd.net

#SYSADMINKA

Make sysadmins great again



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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

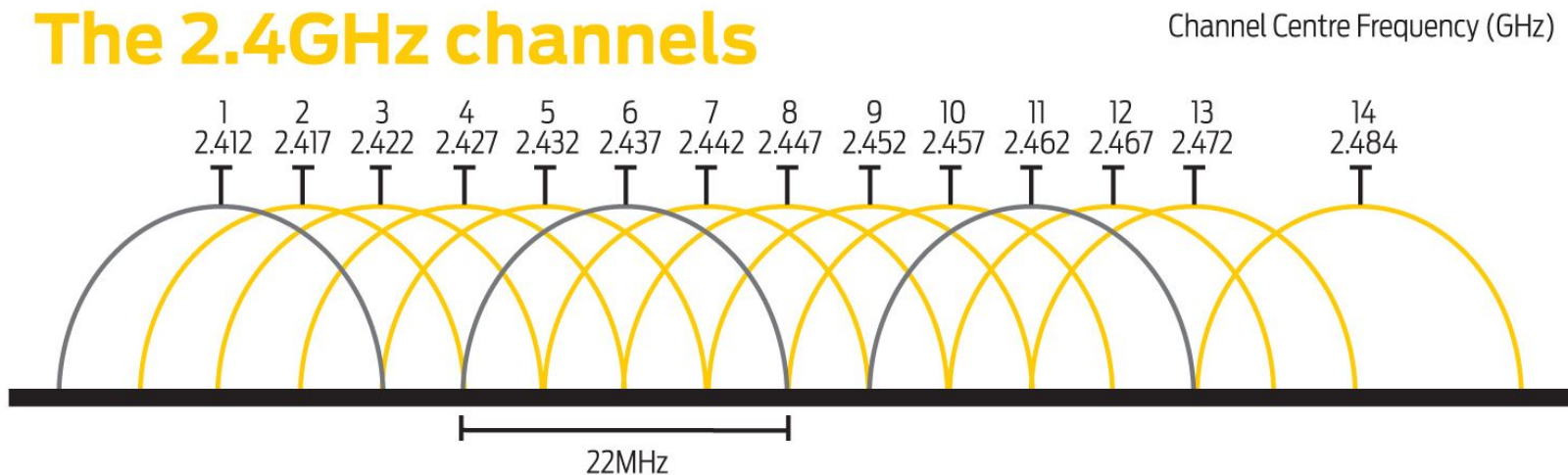
802.11 standard evolution

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

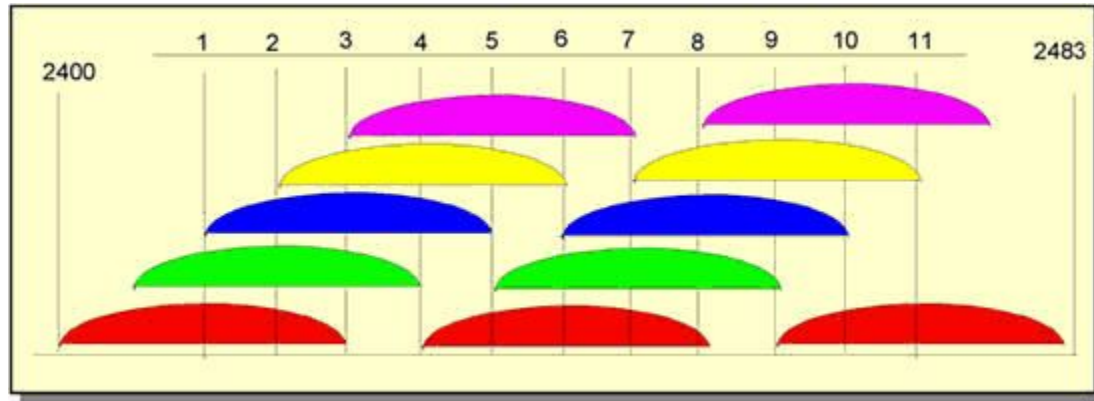
The 2.4GHz channels



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.

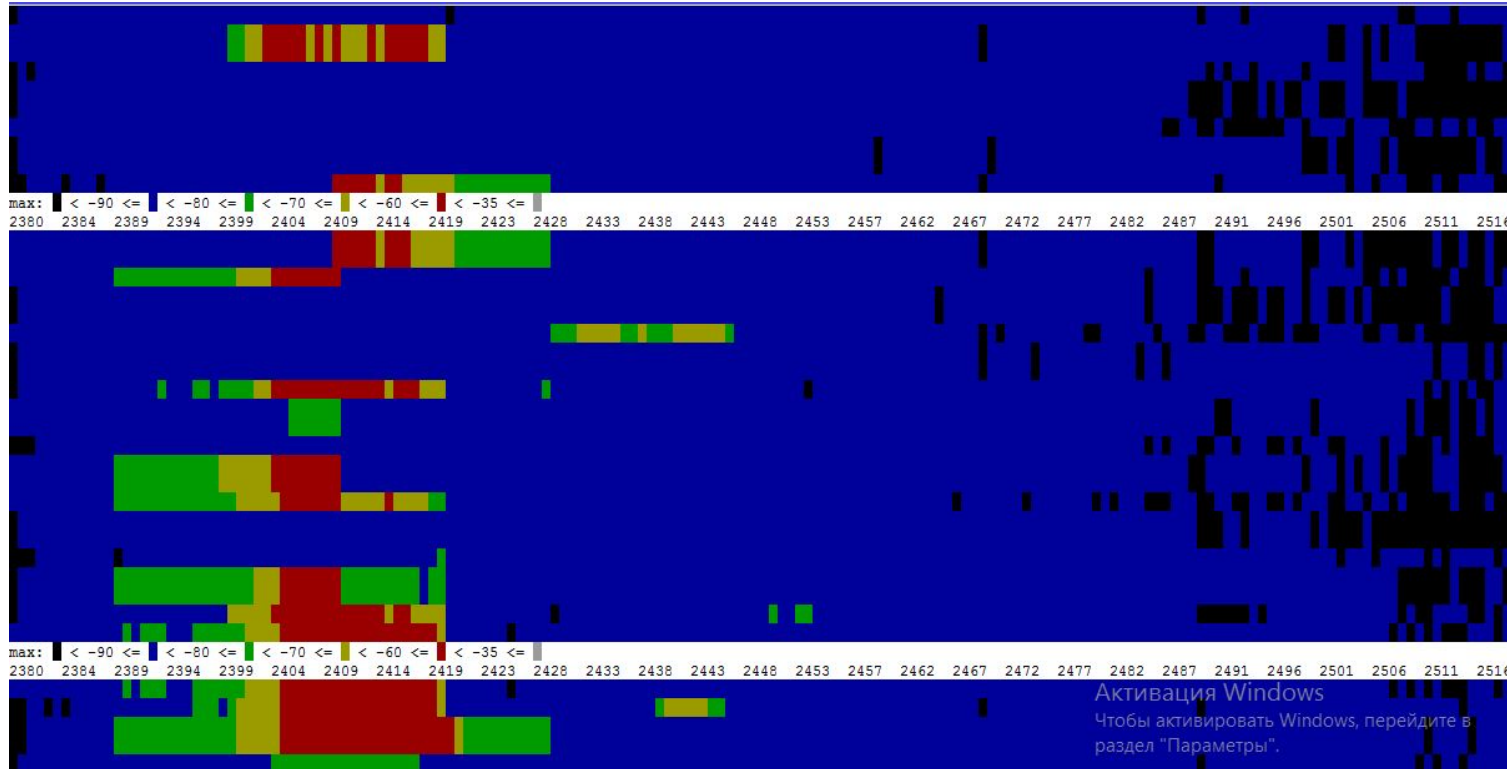


Немного теории

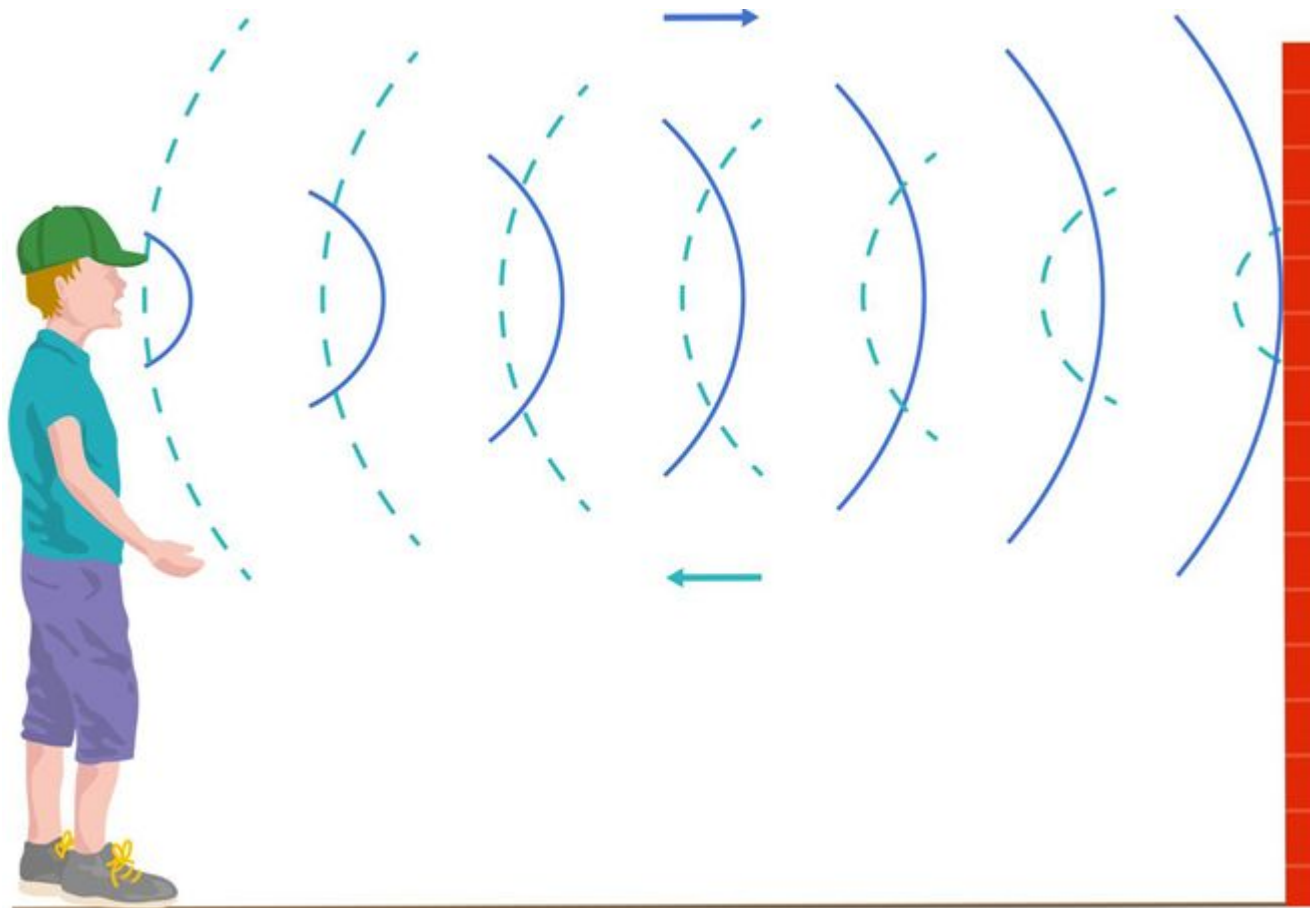


Спектральный анализ

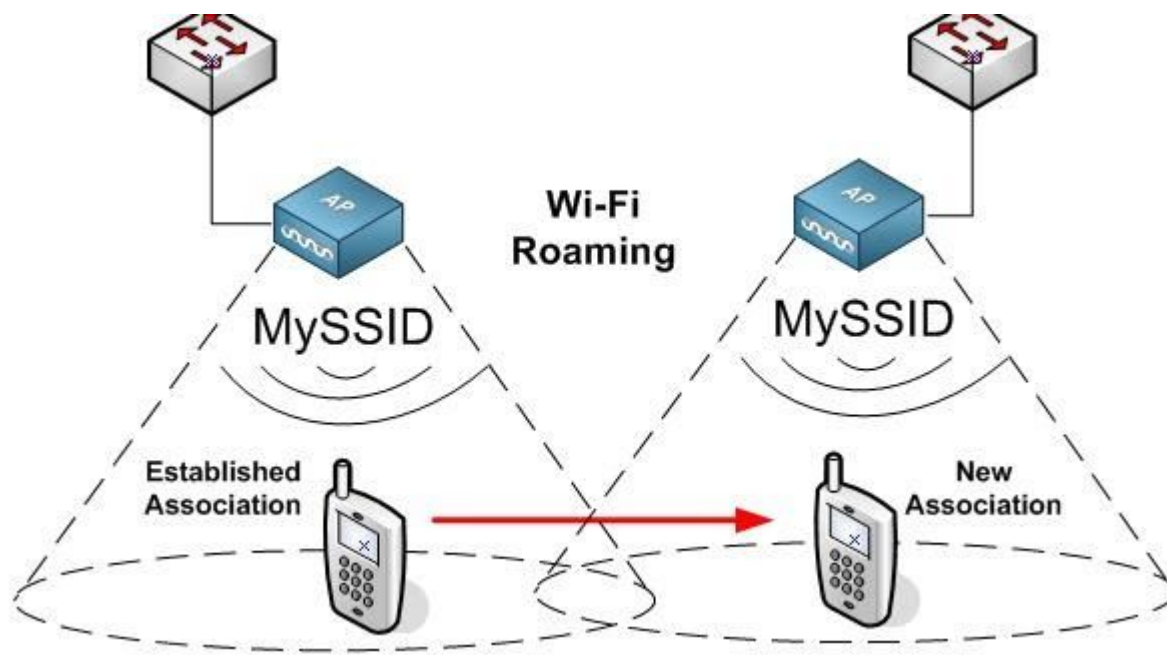
/interface wireless spectral-history wlan1



Немного теории



Роуминг



Вредные советы

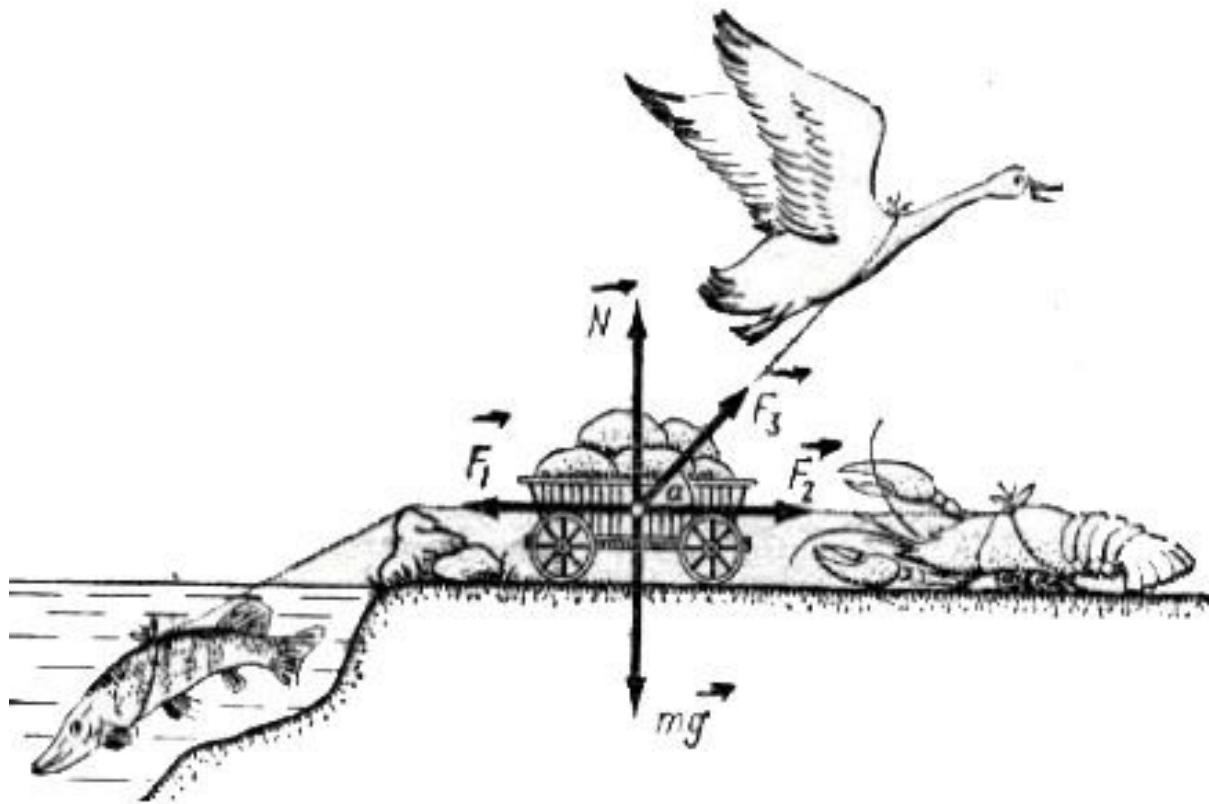
- Частоту ставим auto - точка сама знает, что выбрать
- Ширину канала на максимум - больше данных пролезет
- Мощность передатчика побольше - лучше будет сигнал



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, showing configuration options for CAPs Manager.

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

+ - 📄 🗑️

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

CAPsMAN

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

+ - [Folder Icon] [Filter Icon]

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: ▼

OK Cancel Apply Comment Copy Remove

3 items (1 selected)



CAPsMAN. Datapath

CAPsMAN

Interfaces Provisioning Configurations Channel: Datapaths Security Cfg. Acces

+ - [Icon] [Icon]

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

New CAPs Datapath Configuration

Name:

MTU:

L2 MTU:

ARP:

Bridge:

Bridge Cost:

Bridge Horizor:

Local Forwardin:

Client To Client Forwardir:

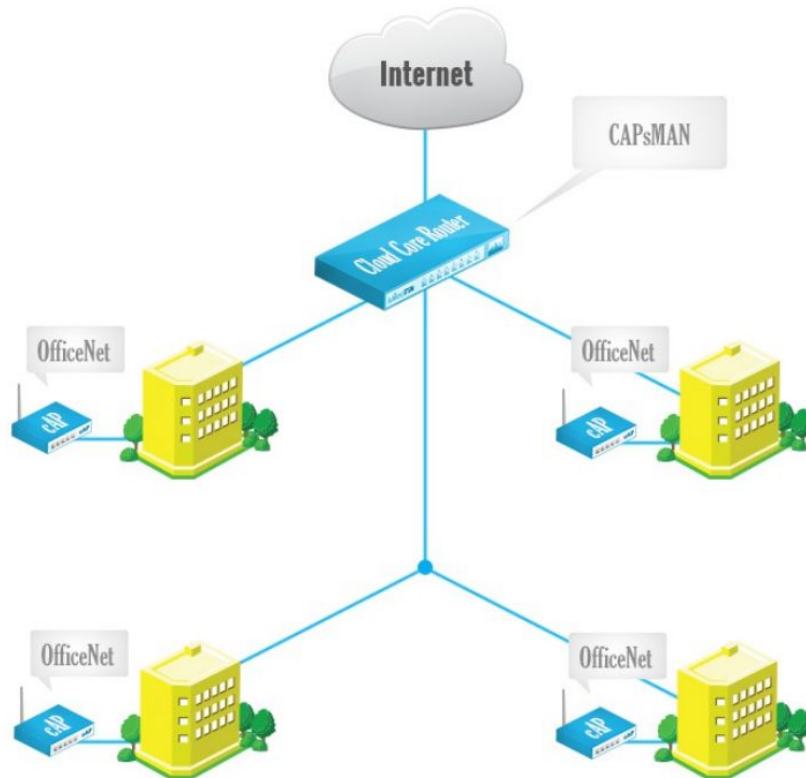
VLAN Mode:

VLAN ID:

OK Cancel Apply Comment Copy Remove



CAPsMAN. Datapath



CAPsMAN. Datapath. Local Forwarding

CAPsMAN

Interfaces Provisioning Configurations Channel: Datapaths Security Cfg. Access List R

+ - [Folder Icon] [Filter Icon]

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

CAPs Datapath Configuration <datapath101>

Name: OK

MTU: Cancel

L2 MTU: Apply

ARP: Comment

Bridge: Copy

Bridge Cost: Remove

Bridge Horizor:

Local Forwarding: ▲

Client To Client Forwarding: ▼

VLAN Mode: ▲

VLAN ID: ▲

2 items



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 shows the Mikrotik CAPsMAN Provisioning interface. The main window has a menu bar with options: Interfaces, Provisioning, Configurations, Channels, Datapaths, Security Cfg., Access List, Rates, Remote CAP, Radio, and Registration Table. Below the menu bar is a toolbar with icons for adding, deleting, saving, and other actions. A table below the toolbar shows a list of CAPs with columns: #, Radio MAC, Identity Reg..., Common Na..., Action, Master Configura..., and Slave Configuration. The first row is selected, showing ID 0, Radio MAC 00:00:00:00:00:00, and Action create di... ud27.

A dialog box titled "CAPs Provisioning <00:00:00:00:00:00>" is open, showing the configuration for a CAP. The fields are:

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

Buttons on the right side of the dialog include: OK, Cancel, Apply, Disable, Comment, Copy, and Remove. The "Action" dropdown menu is currently open, showing the options: create disabled, create dynamic enabled, create enabled, and none.



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 (rule 0). The configuration includes:

- 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 Forwarding: [Empty]
- RADIUS Accounting: [Empty]
- VLAN Mode: [Empty]
- VLAN ID: [Empty]

The dialog is currently set to '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	

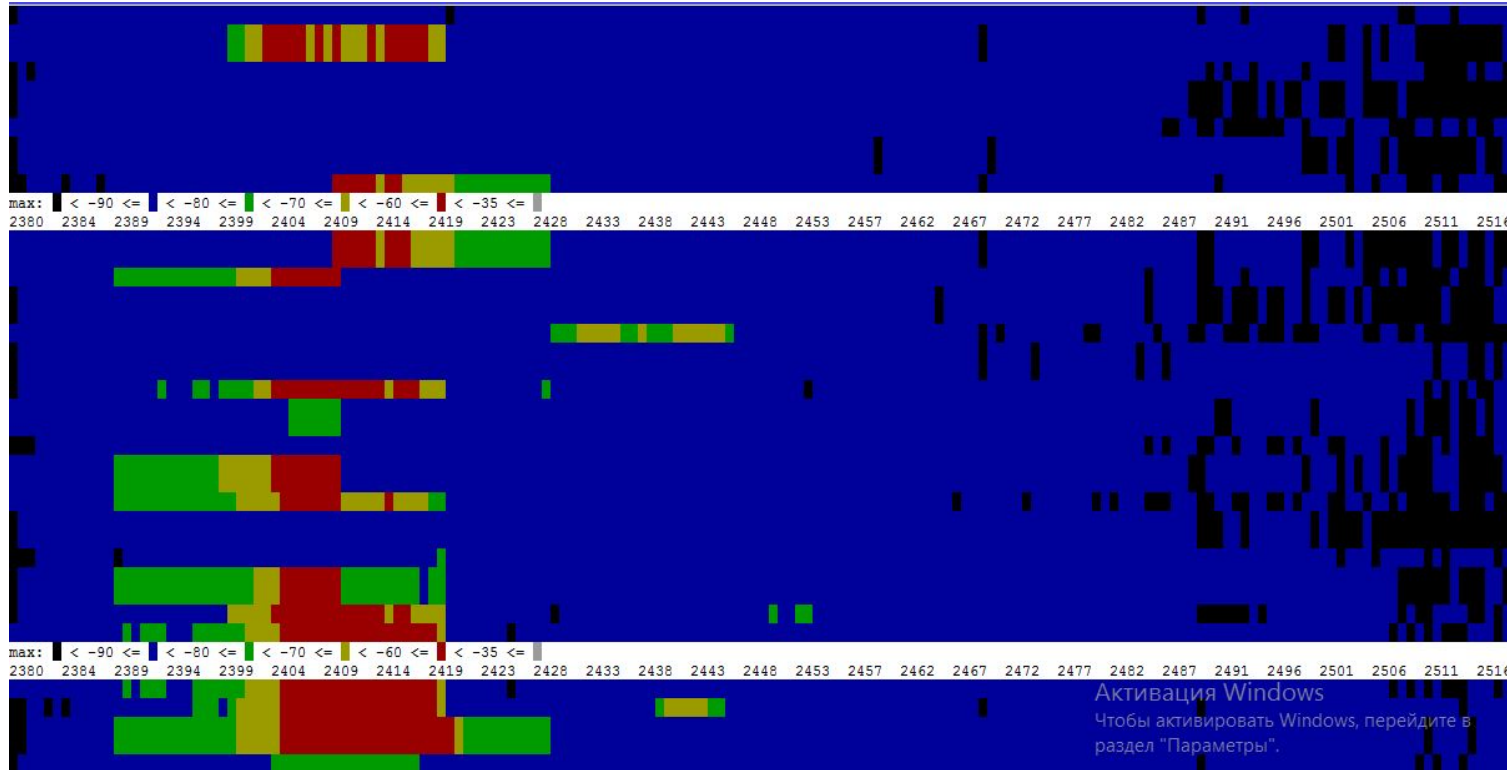


Wi-Fi planners: Ekahau, Tamograph, ...

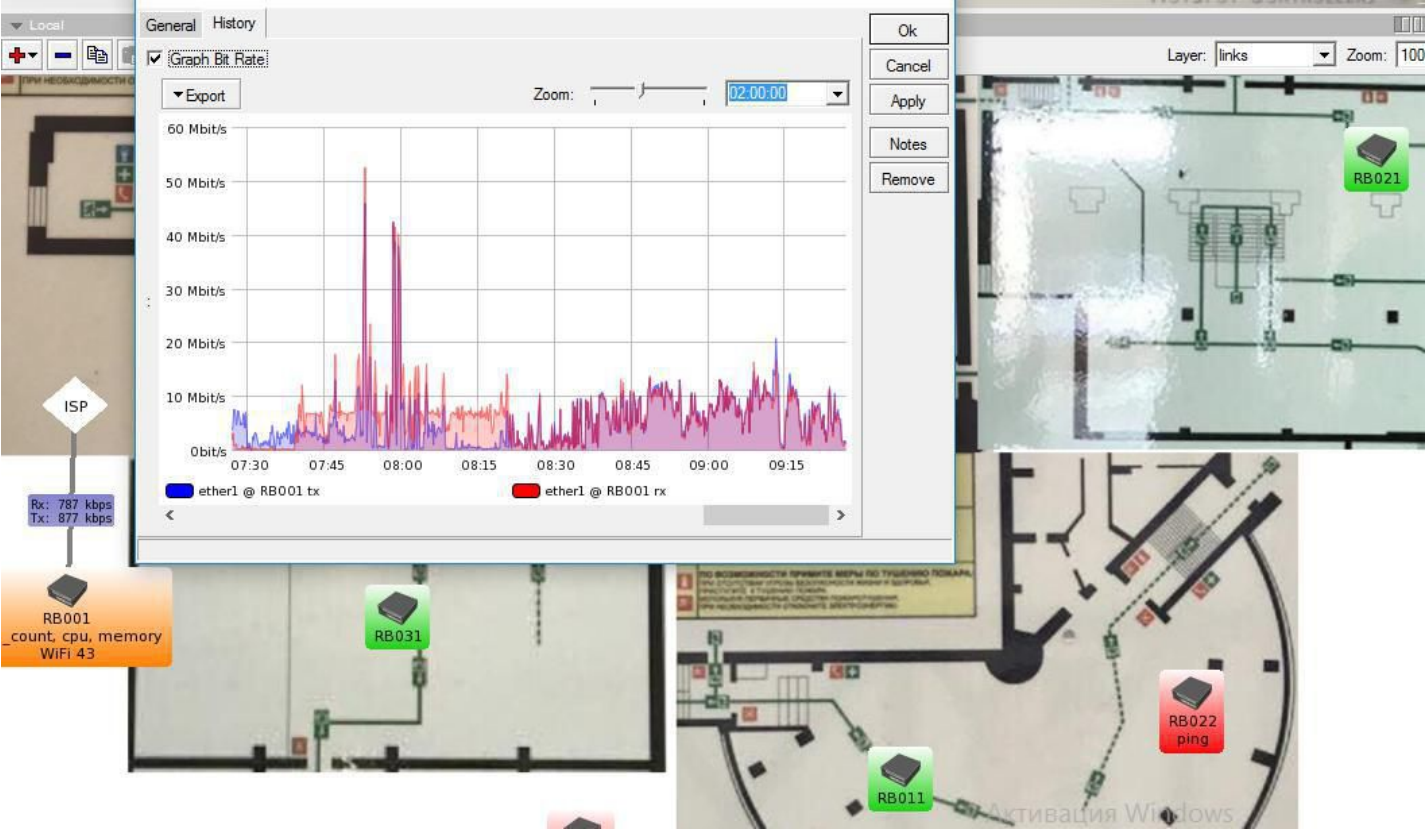


Спектральный анализ

/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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