



Introduction >

Hello and good afternoon,  
Let me introduce myself, my name is Martin Krug, certified Mikrotik Trainer.

and My goal and the theme for today will be to show and explain on the examples from Laboratory and on-site installations the possible problems with Wireless technology in general in the city area and to introduce quite new technologies witch I did tested for you and prepared short overview.

## ||| Intromission

My presentation will demonstrate the importance of wireless technologies even if the city infrastructure is overloaded.

And I will show how to maintain your wireless network's and link's up and running at all time, so you can have a good night sleep and you customer is enjoying your service.

I will focus on small and middle range ISP.

POINT to POINT

MULTIPOINT

Cont..

Because of technology witch they are using mainly MikroTik routers and Wireless AP's.

In generally I will divide my presentation into two parts

Into Point to Multipoint part and Point to Point part because in the technology and usage is huge difference, but they are bounded together.

Only with the cooperation o all technology part's will by your network run without problems.

## POINT to POINT



ISM free bands still used

mostly 5 GHz

10 GHz in Czech republic

24 GHz !!

60 GHz – GigaWave

Licensed bands mostly used

18 GHz

23 GHz

26 GHz



In our countries is mostly used a 5GHz in a small ISP area where Mikrotik is a fair and stable solution. in Czech republic in last one year is the 10GHz segment in Point to Point often used for main UPLINK for distribution sites. And from a local producer of a Licensed band I would like to mention Alcoma CZ witch we tested and compared for you.

## || UP-link technologies



Need for a SPEED

Bonding

and

 Dual Nstreeme Technology – 5GHz

## || Bonding - Incredible speed



Why I decided to test this technology because few weeks before I was doing some configuration's for the ALCOMA and it is a nice combination with the MikroTik RB1000

Imagine 4 pcs ALCOMA F links  
and 2pcs RBxxxx

And speed **1200** Mbps

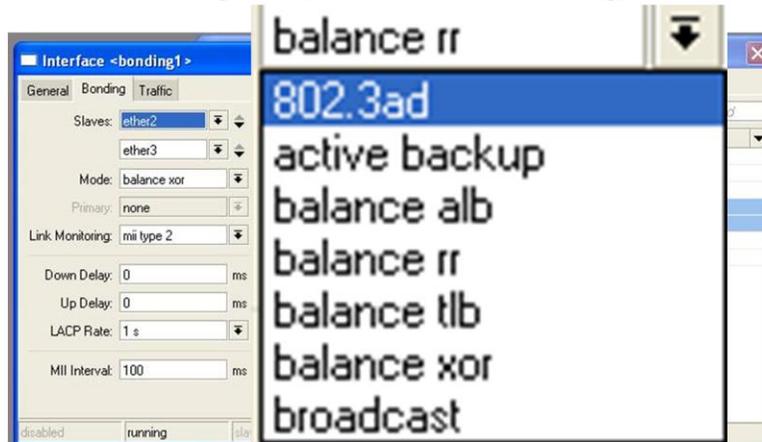
Just so easy

Excellent speed – affordable price

# || Bonding - point of proof



Mode balance rr – is round robin mechanism and when one link will fail it will use other's slave so it is enough if only one link is working and you still have working setup.



## || Bonding - Alcoma technologies



The Alcoma ALxxF link can even work in free ISM band 24GHz and in Czech republic 10GHz with speed's up to 311mbps per outdoor unit and indoor unit can supply two outdoor unit's at the same time



With the usage of RB600 or RB1000  
You can have 600 or 900 Mbps



# 300Mbps test

The screenshot shows a network utility window titled "Ping" with the "Advanced" tab selected. The "Ping To:" field is set to "10.10.10.221". The "Interface:" is set to "any". The "Packet Count:" is set to 251. The "Timeout:" is set to 1000 ms. The "Start" button is visible.

#	Host	Time	Reply Size	TTL	Status
235	10.10.10.221	10ms	50	64	
236	10.10.10.221	10ms	50	64	cp
237	10.10.10.221	0ms	50	64	
238	10.10.10.221	10ms	50	64	
239	10.10.10.221	10ms	50	64	
240	10.10.10.221	0ms	50	64	
241	10.10.10.221	0ms	50	64	
242	10.10.10.221	10ms	50	64	ps
243	10.10.10.221	10ms	50	64	
244	10.10.10.221	10ms	50	64	ps
245	10.10.10.221	10ms	50	64	
246	10.10.10.221	10ms	50	64	
247	10.10.10.221	10ms	50	64	
248	10.10.10.221	10ms	50	64	
249	10.10.10.221	10ms	50	64	
250	10.10.10.221	10ms	50	64	

251 of 251 packets received 0% packet loss Min: 0ms Avg: 3ms

12:03:59

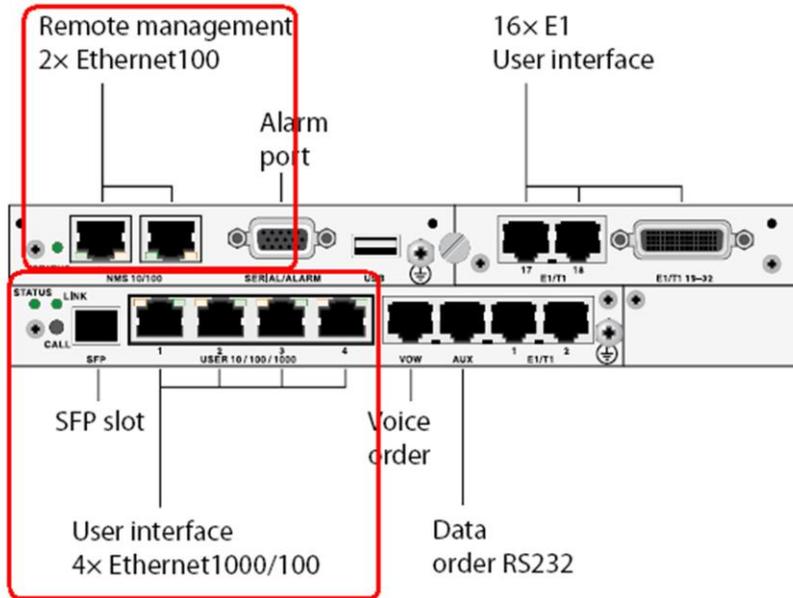
Tx: 212.7 Mbps Rx: 278.6 Mbps

running...

As you can see yes it is possible to have on one link 300Mbps

And still have a nice ping about 10ms

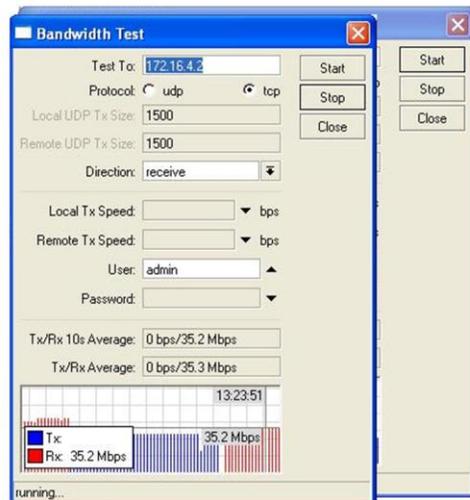
# || MORE PARAMETERS



## || Dual Nstreeme on one antenna



First you have to test all wireless system equipment for a 100% output and input stability.



I hope that probably every one in this room experienced with this technology but got various problems and I would like to help you to solve your problems.

For example when I made this testing I was using a brand new equipment –because it is quite difficult to find a problem When it is already installed on site.

first in the laboratory I figured out that I have a problem on one side with receiving signal so I exchanged a pigtail so I got all connection parameters to equalize for a booth links. Then I started to test throughput on each side and on each link separately And I got some strange problem as you can see on the slides, So I exchanged a wireless MiniPCI card and got all parameters equal.

I do all testing with TCP protocol to get all results more accurate to compare with real traffic.

Then I installed the testing setup on the real site to test performance and throughput for a Uplink distance 1,3km we decided to use only 24dbi dual antenna so I will not over the regulated power output

## || Dual Nstreeme on one antenna



After installing it on real site I got a pphenomenal noise  
distance between channels = 52 db

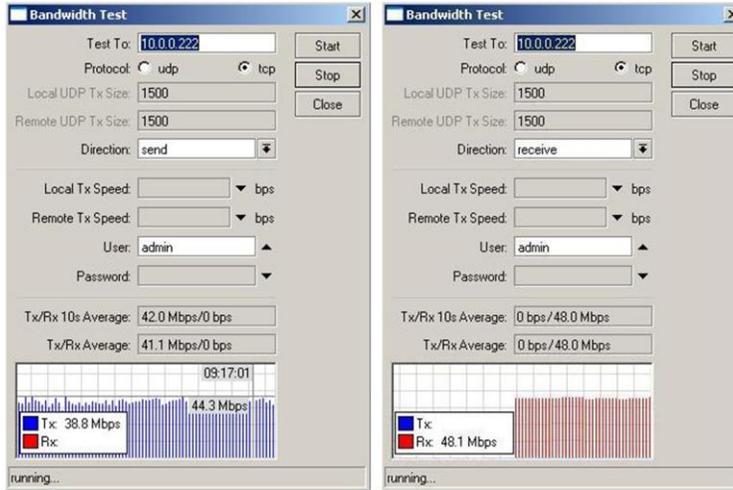
The screenshot shows two windows from a network scanner. The top window, titled "Scan <wlan1>", is inactive. The bottom window, titled "Scan <wlan2> (running)", is active and shows a table of detected wireless networks.

Address	SSID	Band	Frequ...	Signa...	Noise...	Signa...	Radio Name	RouterO...
ABR 00:0B:6B:86:BC:2A	atom	5GHz-turbo	5210	-60	-86	26	000B6B86BC2A	

# || Dual Nstreeme on one antenna



And a quite fair bandwidth up to 48 Mbps



# POINT to MULTIPOINT



## Basic Know-How before install

- Line of sight
- Free Fresnel Zone
- High gain directional antenna
- High quality cabling
- High quality work
  - self vulcanize tape
  - mounting

First I will introduce some technologies which are commonly used in our countries

We can divide into FREE Bands and Licensed Bands

I will do right to the problematic, because I think that we all are at least very familiar with the basic's

Breaking the basic's rules causing most of the problem's.

I will focus on the basic's free band frequencies 2.4 and 5 GHz  
2.4GHz is like old-timer and it is still in-use and you can revitalize your 2.4GHz networks as I will show later.

## Free ISM 2.4 and 5GHz



MikroTik Full support for wireless cards :

Prism II

Atheros AR5000 – AR5006

Problems:

interference

SNR

ACK



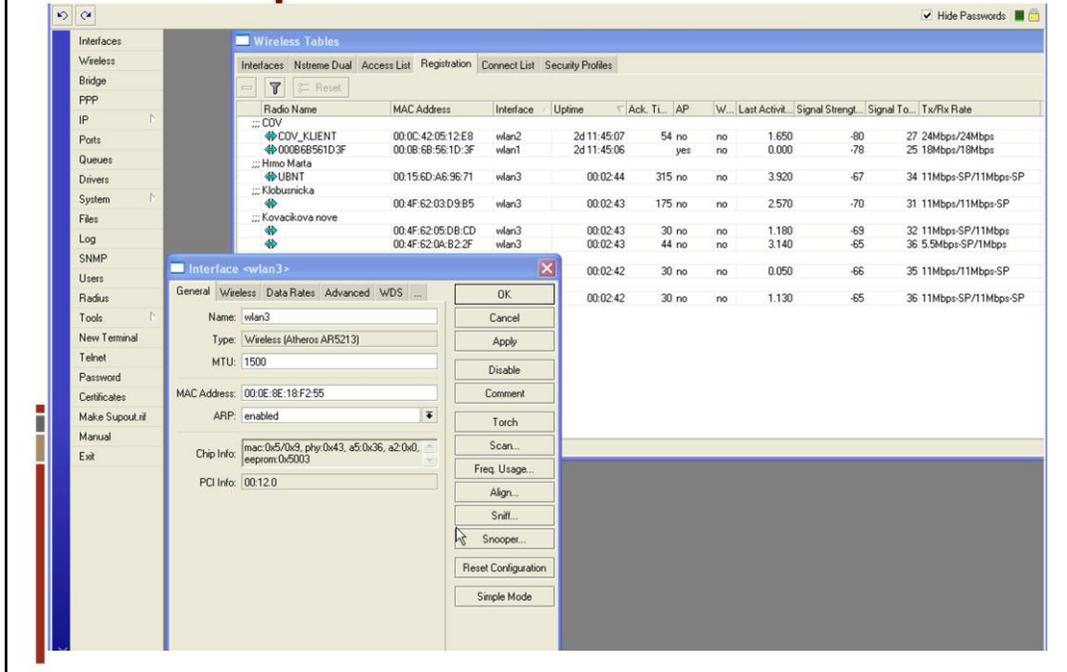
So many producers and thus cards are Different Even from piece to piece even they have the same chipset.

The on site experience is the best way how to test different parameters of each product.

Specially I foccused on the new R52H cards.

In the few minutes I will show differences of cards in the other –dual nstreeme test.

# Client optimization on AP



As a first testing I did done some real 2.4 GHz access point site to try optimize client connection.

After going trough interfaces and settings I found that the Wi-Fi Ethernet card has in Advanced Mode changed TX power to manual and it is set to 30dbm and ad you can see it is quite easy

# Client optimization on AP

As you can see the interference on that AP is really incredible.

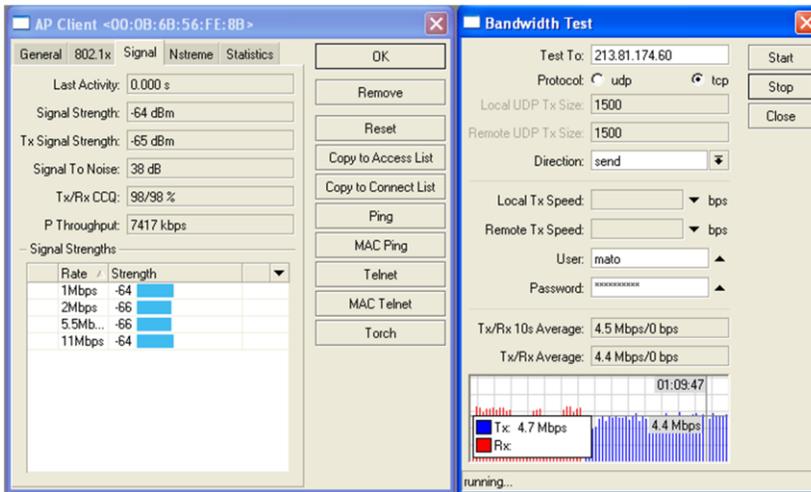
The AP is seeing up to 70 others AP's

And still you will be able to get a good and stable AP

Address	SSID	Band	Fre...	Signa...	Noise...	Signal To N...	Radio Name
BP 00:11:5C:1B:C2:00	Nemak	2.4GHz-8	2472	-93	-101		8
BP 00:11:5C:1B:C2:01	Shared	2.4GHz-8	2472	-93	-101		8
B 00:02:6F:43:4E:DC	pc6000	2.4GHz-8	2472	-92	-101		9
BR 00:0C:42:05:7A:A3	HNHAP22	2.4GHz-8	2472	-89	-101		12 000C42057A
ABP 00:50:7F:80:E8:08	PUFNET	2.4GHz-8	2472	-83	-101		18
ABR 00:0B:6B:D3:55:74	pc7000	2.4GHz-8	2472	-79	-101		22 000B6BD955
B 00:50:7F:DC:5F:88	3N	2.4GHz-8	2467	-91	-100		9
ABR 00:0B:6B:4E:E2:07	znhap3	2.4GHz-8	2467	-87	-100		13 000B6B4EE2
AB 00:18:F3:33:C7:A5	delaultp	2.4GHz-8	2467	-77	-100		23
ABP 00:4F:6A:00:62:FD	Aslive	2.4GHz-8	2462	-93	-101		8
B 00:50:7F:DC:3C:A0	Albinet	2.4GHz-8	2462	-92	-101		9
BPR 00:0B:6B:2D:21:15	STO	2.4GHz-8	2462	-90	-101		11 STO AP
AB 00:19:51:02:4F:60	B-doma	2.4GHz-8	2462	-90	-101		11
BP 00:1E:2A:4E:4C:48	NETGEAR	2.4GHz-8	2462	-90	-101		11
BP 00:4F:62:1E:A4:7C		2.4GHz-8	2462	-83	-101		18
BP 02:22:80:9B:A9:5F	k-net	2.4GHz-8	2462	-83	-101		18
AB 00:02:6F:43:4E:83	tmavka2	2.4GHz-8	2462	-80	-101		21
AB 00:02:6F:43:4F:43	0905449952	2.4GHz-8	2462	-80	-101		21
AB 00:02:6F:43:4E:A4	znhap2	2.4GHz-8	2462	-73	-101		28
BP 00:22:80:00:75:1C		2.4GHz-8	2457	-92	-101		9
ABP 00:0B:6B:2C:F3:B9	IPM	2.4GHz-8	2457	-89	-101		12 AP2
ABP 00:4F:62:1B:2B:05	marnet	2.4GHz-8	2457	-78	-101		23
AB 00:02:6F:43:4E:A9	Sibak	2.4GHz-8	2457	-73	-101		28
B 00:0E:A6:84:CD:06	mami	2.4GHz-8	2452	-92	-101		9
B 00:4F:62:12:A2:BD	Bnet	2.4GHz-8	2452	-92	-101		9
AB 00:19:CB:05:C9:CB	Internet	2.4GHz-8	2447	-94	-101		7

I will try to publish all picture's and video's witch will be relevant to Mine testing.

# Client optimization on AP



And still even in so hard environment you can get about a 5 Mbps so it means usually about 2.5 Mbps per client

So it is usually acceptable by the client

## ||| Client optimization on AP

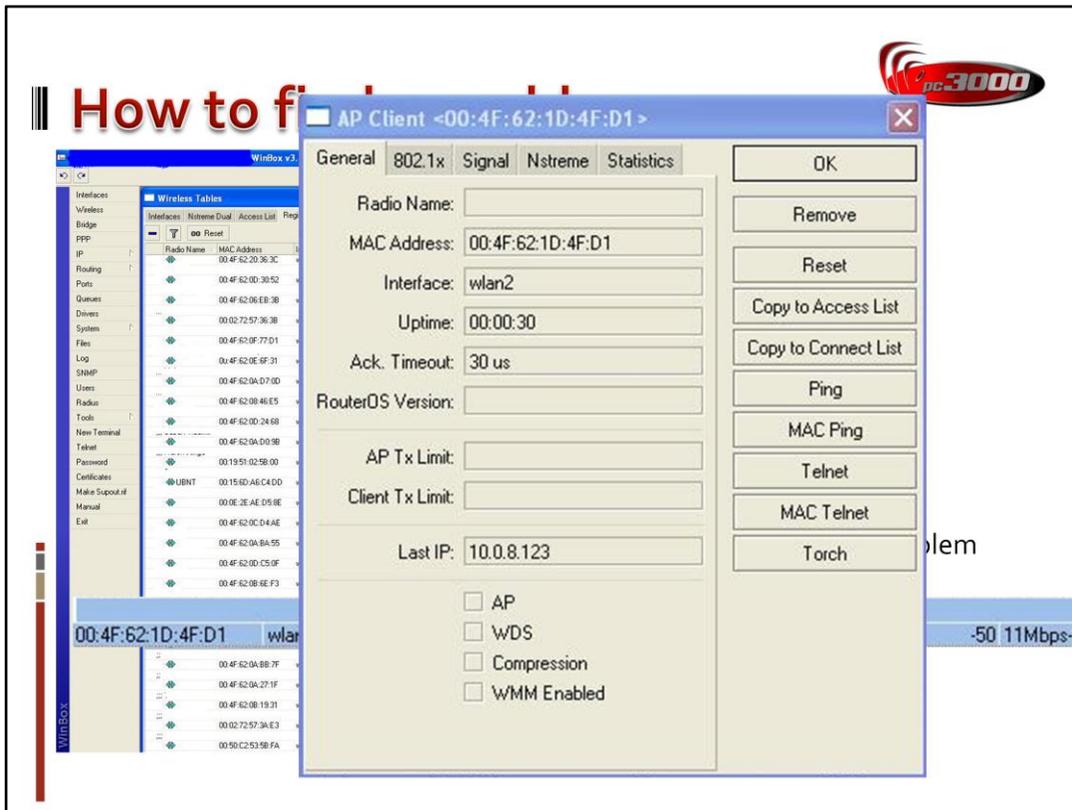
The Question is, the value of Acknowledge timeout for receiving ACK packet ?

Answer is quite complicated.

Automatic settings is required in Wi-Fi technology.

In 2.4 GHz not so dramatic – about 30  $\mu$ s

5GHz it have to be precise – f.e. 5km about 54  $\mu$ s



As a second optimization I had another access point where client had complained that he have problem to get pages from time to time.

When I went trough a list of connected client's first I inspected a wireless interfaces on one is connected in one time about 13 clients and on the other about 11 that looks like the maximum what I can suggest.

Then I went trough list of client's and we got lucky because in Mikrotik version 3.X you can enable to see all kind of parameter's And in this and in all other cases you will need to see SNR and ACK parameters.

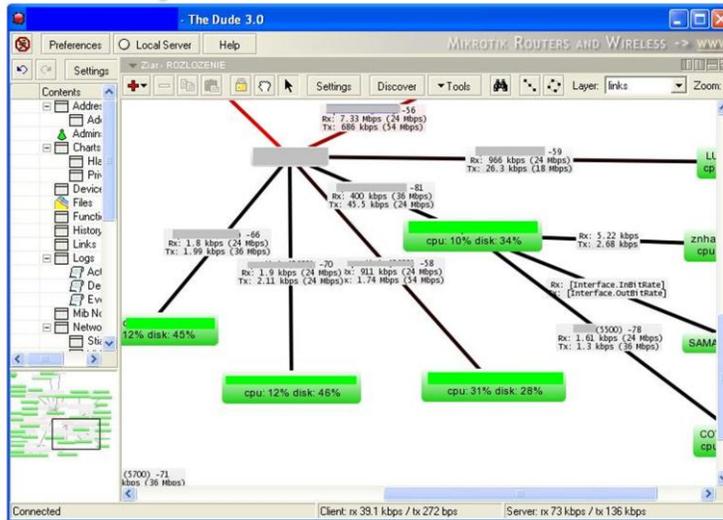
Practically all client's had a good signal quality and ACK jus right about 30 nd I found our problematic client.

As you can see he has a nice signal -50dbm butt the ACK is too high and it will affect all other clients as well.

He had some experience with this problem and after visiting this customer we found that In this case the problem is the one basic rule – cabling.

The Installer was not using a

# Client optimization on AP



Nice tool to keep track of customers even they do not have a Mikrotik devices

Is SNMP management the Dude, you should use it to watch when the problem started and it will help to determine area of the problem.

It is a quite usable for all devices with SNMP support, Mikrotik Dude has preloaded MIBs (Management Information Base) so you are able to use it practically on anything.

## || Resources

Mikrotiks

Alcoma s.r.o.

Ing. Jan Jirous J&J

Netcons s.r.o.

Pc3000 s.r.o.



From the beginning of this whole test I needed some equipment.

And I got a big support from the following companies

for borrowing all necessary equipment for the test sites on the real environment

# || WORKSHOP



I would love to invite you at the discussion table

THANK you.

