



# Most Common Mistake on MikroTik configuration

Paul Darius

MikroTik User Meeting  
Kuala Lumpur – Malaysia  
June 12, 2019

# About me



Name: Paul Darius

MikroTik Certification :

- MTCNA (2011)
- MTCTCE
- MTCUME
- MTCRE
- MTCINE
- MTCWE
- MTCSE
- TRAINER (TR0606)

Work :

- Company: ATS / Asia Teknologi Solusi
- Assignment: NOC



# MikroTik Certified Consultant



Paul Darius

Komplek Cendana C/4 - Kubu Marapalam - Padang Timur,  
**Indonesia**

Tel: +627518951777



# Padang to Kuala Lumpur



# West Sumatra





# About ATS



- PT Asia Teknologi Solusi
- Established since 1998
- Data center since 2006
- Internet Service Provider since 2014
- Coverage area:
  - East Tangerang
  - Jakarta
  - North Depok
  - Bekasi
  - Kerawang
  - Purwakarta
- MikroTik Training Center



# ATS Coverage Area





# ATS Services

- Dedicated Internet Connection
- Broadband Internet Connection
- Interconnection
- Local-loop
- Server Hosting / Colocation
- WEB & Email hosting
- Managed Services
- Etc.



# How to reach us ?

- Asia Teknologi Solusi  
Sentra Niaga Blok N-17  
Green Lake City, Duri Kosambi  
West Jakarta – 11750 – Indonesia
- Phone: (62-21) 225 242 012
- Homepage : <https://www.ats-com.net>
- email [sales@ats-com.net](mailto:sales@ats-com.net)

# Objective

- To help you understand and diagnose most common RouterOS configurations issues
- Show the proper application of RouterOS features to avoid configurations issues
- Encourage you to use latest RouterOS versions and newest features



# Presentation Material

- This presentation will consist of the most popular problems compiled sent to mikrotik forum discussion and groups.
- Examples are compressed / combined / simplified for presentation purposes
- The presentation will show configuration issues and improved configuration

# NAND router FULL

Resources

Uptime: 00:05:59

Free Memory: 9.8 MiB

Total Memory: 32.0 MiB

CPU: MIPS 24Kc V7.4

CPU Count: 1

CPU Frequency: 650 MHz

CPU Load: 2 %

Free HDD Space: 344 KiB

Total HDD Size: 16.0 MiB

Sector Writes Since Reboot: 8 403

Total Sector Writes: 105 083

Bad Blocks: 0.0 %

Architecture Name: smips

Board Name: hAP mini

Version: 6.42.10 (long-term)

Build Time: Nov/14/2018 15:04:25

Factory Software: 6.40.4

Package List

Check For Updates

Enable

Disable

Uninstall

Name	Version	Build Time
routeros-smips	6.42.10	Nov/14/2018 15:04:25
advanced-tools	6.42.10	Nov/14/2018 15:04:25
dhcp	6.42.10	Nov/14/2018 15:04:25
hotspot	6.42.10	Nov/14/2018 15:04:25
ipv6	6.42.10	Nov/14/2018 15:04:25
mpls	6.42.10	Nov/14/2018 15:04:25
ppp	6.42.10	Nov/14/2018 15:04:25
routing	6.42.10	Nov/14/2018 15:04:25
security	6.42.10	Nov/14/2018 15:04:25
system	6.42.10	Nov/14/2018 15:04:25
wireless	6.42.10	Nov/14/2018 15:04:25

File List

Backup

Restore

Upload...

File Name	Type	Size
advanced-tools-6.42.12-smips.npk	package	68.1 KiB
dhcp-6.42.12-smips.npk	package	140.1 KiB
hotspot-6.42.12-smips.npk	package	144.1 KiB
ipv6-6.42.12-smips.npk	package	192.1 KiB
mpls-6.42.12-smips.npk	package	56.1 KiB
multicast-6.42.12-smips.npk	package	36.1 KiB
openflow-6.42.12-smips.npk	package	44.1 KiB
ppp-6.42.12-smips.npk	package	252.1 KiB
routing-6.42.12-smips.npk	package	68.1 KiB
security-6.42.12-smips.npk	package	288.1 KiB
system-6.42.12-smips.npk	package	5.2 MiB
tr069-client-6.42.12-smips.npk	package	108.1 KiB
wireless-6.42.12-smips.npk	package	928.1 KiB



# Problem Analysis

- Problem:
  - NAND on the router FULL and an error message appears on the LOG router
- Diagnosis:
  - “System Resouce” show Free Space about 0.5MB
  - “System Package” show almost all package installed even if never been used.
- Reson:
  - Packages that do not use (although have been disabled) still need space on the NAND router

# Package Management

Paket	Fungsi
advance-tool	Advanced ping tools, Netwatch, ip-scan, SMS tool, Wake-on-LAN
calea	Communications Assistance for Law Enforcement Act
dhcp	Dynamic Host Control Protocol client and server
hotspot	HotSpot captive portal server for user management
ipv6	IPv6 addressing support
mpls	Multi Protocol Labels Switching support, Traffic engineering
ntp	Network protocol server
ppp	PPP, PPTP, L2TP, PPPoE, PPP servers and clients
routing	Dynamic routing: RIP, BGP, OSPF
security	Secure WinBox, SSH, IPsec
system	Basic features: static routing, firewall, bridging, etc.
wireless	802.11 a/b/g/n/ac support, CAPsMAN v2
user-manager	User Manager support



# Correct Implementation

- Remove unneeded packages like calea, gps, ipv6, mpls, ntp, openflow, tr069, and other packages that are likely not to be used.
- Don't use bundled packages like:
  - × routers-mipsbe-6.42.12.npk
  - × routers-smips-6.42.12.npk
  - × routers-mmips-6.42.12.npk
  - × routers-ppc-6.42.12.npk
  - × routers-tile-6.42.12.npk
  - × routers-arm-6.42.12.npk
  - × routers-x86-6.42.12.npk

Because the individual packages that are included in the above bundled package cannot be deleted, they can only be disabled so that it still occupies space in storage / NAND

- It strongly recommend that you use an Extra Package because we can add and or delete each individual package that we use.

# Bundled Package

### Resources

Uptime: 00:03:06

Free Memory: 10.5 MiB

Total Memory: 32.0 MiB

CPU: MIPS 24Kc V7.4

CPU Count: 1


CPU Frequency: 650 MHz












CPU Load: 0 %

Free HDD Space: 7.9 MiB

Total HDD Size: 16.0 MiB

### Package List



Name	Version
 routeros-smips	6.42.11
 advanced-t...	6.42.11
 dhcp	6.42.11
 hotspot	6.42.11
 ipv6	6.42.11
 mpls	6.42.11
 ppp	6.42.11
 routing	6.42.11
 security	6.42.11
 system	6.42.11
 wireless	6.42.11



# Extra Package

Resources

Uptime: 00:04:50

Free Memory: 13.9 MiB

Total Memory: 32.0 MiB

CPU: MIPS 24Kc V7.4

CPU Count: 1


CPU Frequency: 650 MHz








CPU Load: 0 %

Free HDD Space: 8.3 MiB

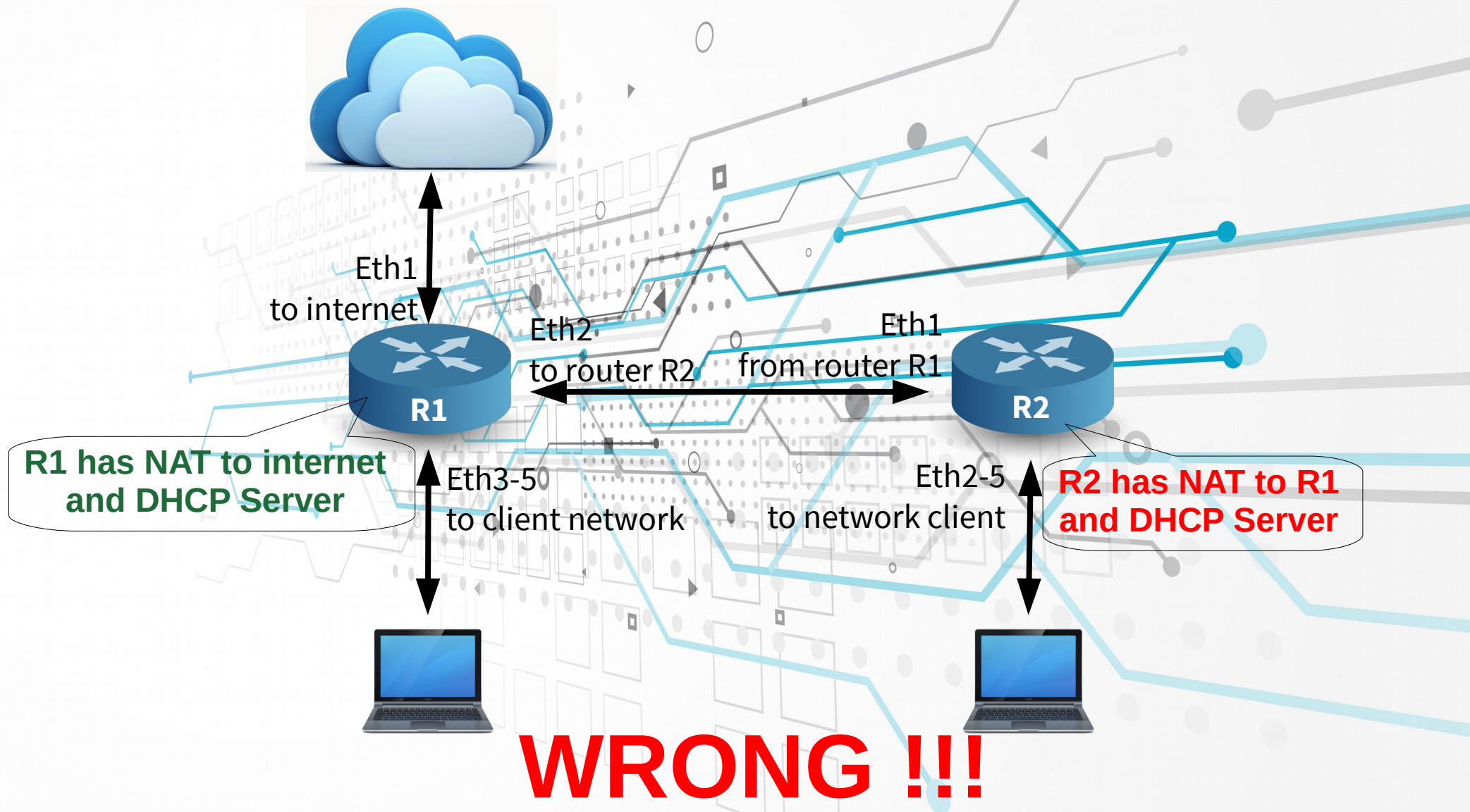
Total HDD Size: 16.0 MiB

Package List



Name	Version
 advanced-tools	6.42.12
 dhcp	6.42.12
 ppp	6.42.12
 routing	6.42.12
 security	6.42.12
 system	6.42.12
 wireless	6.42.12

# Double or Triple NAT





# Problem Analysis

- Computer that connected to R1 will not be able to do P2P communication to computer that connected to R2
- Separate DHCP server between R1 and R2
- Cannot be a firewall on R1 for computers connected to R1 and R2; unless the same firewall are installed again on R2. So it's double effort.

# Correct Implementation

- Take-out ether2 on R1 from bridge
- Allocate P2P ip address from ether2 @ R1 to ether1 @ R2
- Put static routing from R1 to R2
- Add DHCP-Relay from R1 to R2 so DHCP Lease at R1 will contain all leased both on R1 and R2
- The firewall configuration is only on R1.



# Wireless

/interface wireless

```
set [ find default-name=wlan1 ] mode=ap-bridge band=2ghz-b/g/n \
channel-width=20/40mhz-Ce frequency=2437 ssid=Office
```

Apakah ada yang salah dengan konfigurasi di atas ???

**WRONG !!!**

# Problem Analysis (1)

- By using 20 / 40MHz band, the available channels are only 7; not 11.
- Most of the client devices do not support 40MHz band

The screenshot shows a configuration window for the 'wlan1' interface. It has several tabs: General, Wireless, HT, HT MCS, WDS, Nstreme, Status, and Traffic. The 'General' tab is selected. The configuration includes:

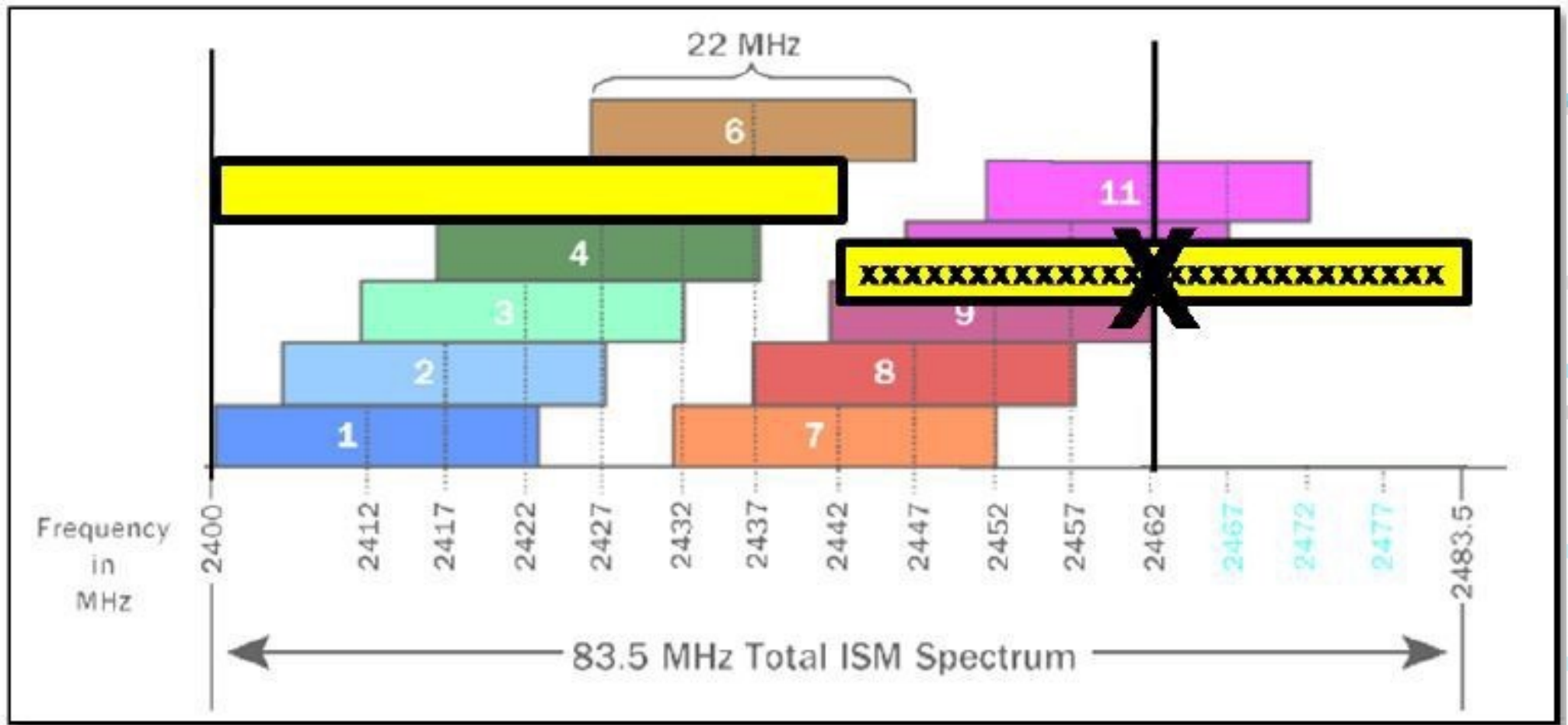
- Mode: ap bridge
- Band: 2GHz-B/G/N
- Channel Width: 20/40MHz Ce
- Frequency: 2437 MHz
- SSID: 2412
- Scan List: 2417, 2422, 2427, 2432
- Wireless Protocol: 2437
- Security Profile: 2442
- WPS Mode: push button

- If all clients use 40Mhz and then there is one client connects with 20Mhz, then everyone will be 20Mhz

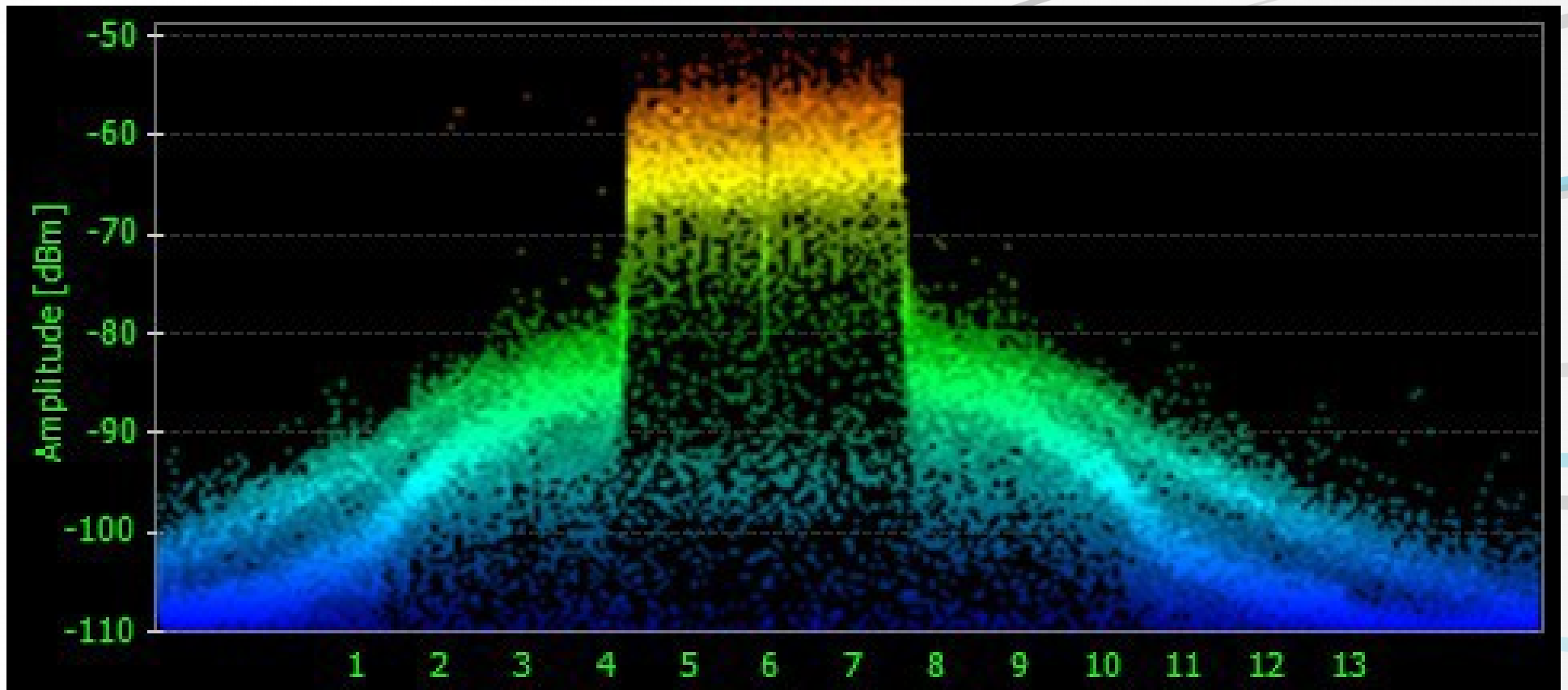


# Problem Analysis (2)

- By using 20 / 40MHz then only 1 non overlapping channels available



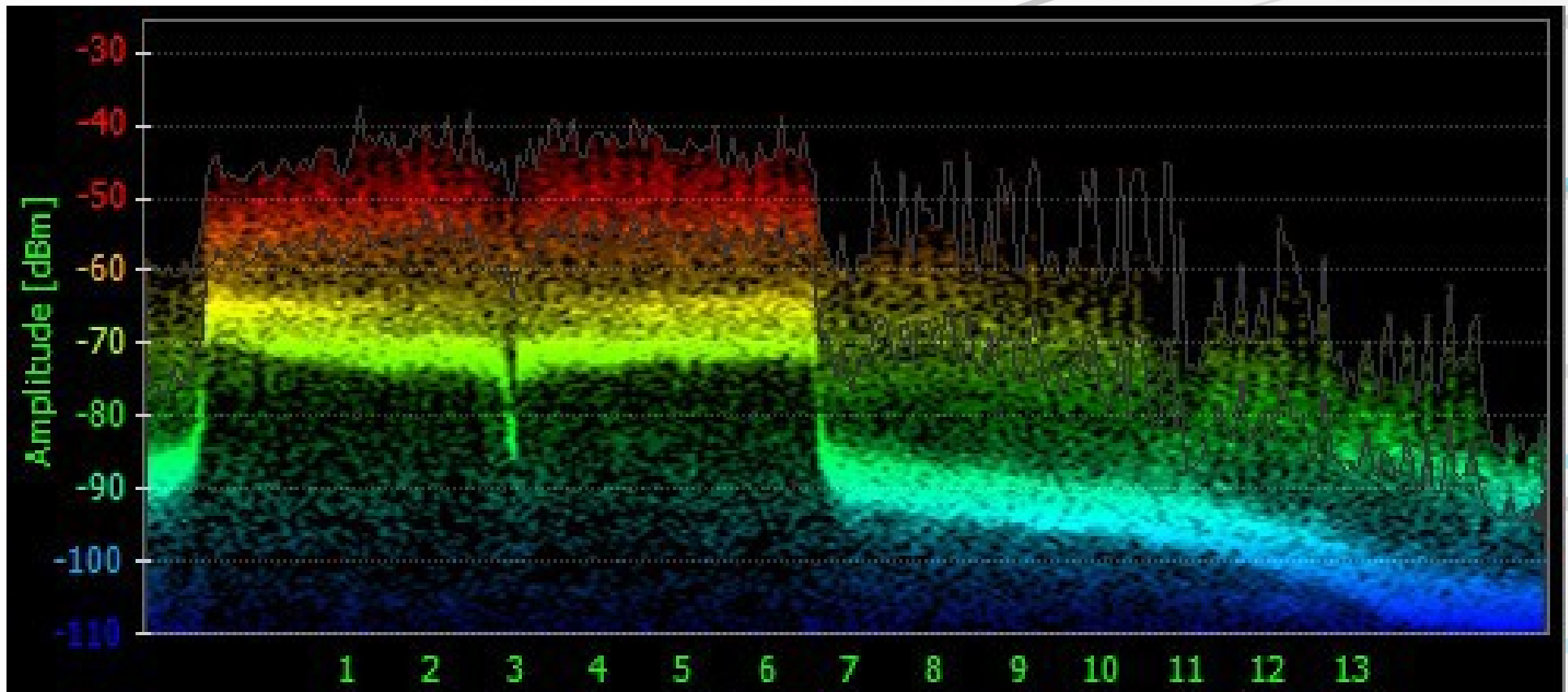
# Spectrum 20Mhz @ 2.4GHz





# Spectrum 40Mhz @ 2.4GHz

0



# Problem Analysis (3)

- Standard 802.11 wireless network uses CSMA / CA (Carrier-sense multiple access with collision avoidance)
- Standard wireless 802.11 b uses a 22Mhz channel width
- Standard wireless 802.11 a and 802.11 g use a of 20 MHz channel width
- Standard wireless 802.11 n standard uses a 20/40 Mhz channel width



# Correct Implementation

/interface wireless

```
set [ find default-name=wlan1 ] mode=ap-bridge band=2ghz-g/n \  
channel-width=20mhz frequency=2437
```

- Use g-only atau g/n if the connected client device is not an old device from the early 2000s.
- Use channel-width 20mhz (disable extended channel on capsman) to get a better choice of non-overlapping channels.
- If the distance between APs is close enough, reduce tx-power to force the client to move AP.

# L7 => High CPU Load

```
/ip firewall layer7-protocol  
add name=youtube regexp="^.*(youtube).*\ $"  
add name=facebook regexp="^.*(facebook).*\ $"  
  
/ip firewall filter  
add action=drop chain=forward layer7-protocol=facebook  
add action=drop chain=forward layer7-protocol=youtube
```

**WRONG !!!**



# Problem Analysis

- Problem:
  - High CPU load, increased latency, packet loss, jitter, youtube and facebook is not blocked
- Diagnosis:
  - “/tool profile” high layer7 load
- Reason:
  - Each connection is rechecked over and over again
  - Layer7 is checked in the wrong place and against all traffic

# Layer 7

- Layer7-protocol is a method of searching for patterns in ICMP/TCP/UDP streams
- On trigger Layer7 collects next 10 packets or 2KB of a connection and searches for the pattern in the collected data
- All Layer7 patterns available on the Internet are designed to work only for the first 10 packets or 2KB of a connection.



# Correct Implementation

/ip firewall mangle

add action=mark-connection chain=prerouting protocol=udp dst-port=53 **connection-mark=no-mark** layer7-protocol=youtube **new-connection-mark=youtube\_conn** passthrough=yes

add action=mark-packet chain=prerouting  
connectionmark=youtube\_conn new-packet-mark=youtube\_packet

/ip firewall filter

add action=drop chain=forward packet-mark=youtube\_packet

add action=drop chain=input packet-mark=youtube\_packet

(and do the same set for facebook and others)





# Wanna to reach me ?

- Email: paul@ranahminang.net
- Twitter: <https://twitter.com/PaulDarius67>
- Instagram <https://www.instagram.com/prawir67>

# References

- Common MikroTik WiFi mistakes and how to avoid them by Ron Touw – MUM UK 2018
- Most underused and overused RouterOS tools and features by Janis Megis – MUM US 2017
- <https://wiki.mikrotik.com>