

# Why I Hate MikroTik



# MikroTik SA

- Presented by David Savage from MikroTikSA (no we are not part of MikroTik Latvia in any way!)
- Certified trainer and support engineer
- Delivered first MikroTik training session on the original Moodle platform somewhere around 2004/2005
- Has a lot of experience in hearing clients complain about why MikroTik cannot perform this certain exact function they need / want / wish for
- I'm from Cape Town, South Africa – it's really as nice as they say!



# Full Disclosure

- I actually love MikroTik

# What's this all about then?

- Common misconceptions
  - Unrealistic expectations
  - Lack of research
  - Lack of understanding
- 
- I love MikroTik except why can't it do this one very specific function that I need inside my network right now?

# Actual Conversation at a Technical Conference

- Big ISP Tech Consultant human (BITCh)

“Why doesn't MikroTik support TR069? It would make my life so much easier”

Me “Well I know it's on the requested features list, it will likely be along soon”

BITCh “Mumble groan something – well it better be, I need this quickly”

Fast forward 6 months....

Me to same consultant at another meeting “Hey – check it out, MikroTik now supports TR069”

Response “Well I wish they would stop wasting time on that and bring out ROSv7 already!”

# Common Misconceptions

- Outdoor Wireless
  - Product A, B, C, M and U is so much better – just plug in and go and it just works
- Yes, this is probably true from a setup point of view
  - Until you need fine grained access over settings
- Rather than “dumbing it down” MikroTik gives you access to every component of the hardware for very fine level tweaking
  - However – you need to know what you are doing

# Magic Bullet Solution?

- Airmax, Wjet, iPoll, Canopy, Jet, etc.
- It's all just TDMA (NV2) with a few massages and tweaks, maybe some beamforming, maybe perhaps a fancy antenna element with a bit of fancy software
- Fact is
  - You can't change physics
  - When you run out of spectrum, no amount of technology will help
  - Any wireless device will perform well under perfect network conditions
  - If you replace your 10 year old rusted grid antenna with an ancient CM9 wireless card with a new dish and AC radio – of course it's going to perform better!



# You may not know

- The MikroTik NV2 protocol has some incredibly powerful features to optimise bandwidth distribution and AP Sync
- Uplink percentage can re-prioritise NV2 timeslots to favour upload or download depending on your requirements

# NV2 Downlink Ratio

Interface <wlan1>

Wireless HT HT MCS WDS Nstreme **NV2** Status Traffic ...

TDMA Period Size: 2ms

Cell Radius: 30 km

Security

Preshared Key: Some Very Strong Secret

Mode: fixed downlink

Downlink Ratio: 80 %

Sync Secret:

Queue Count: 2

QoS: default

OK  
Cancel  
Apply  
Disable  
Comment  
Advanced Mode  
Torch  
WPS Accept  
WPS Client  
Setup Repeater

# You may not know

- NV2 Master/Slave configuration can sync AP's on the same or even different sites
  - NO GPS Sync module is required – not the case with other much more expensive products
  - Support is backwards compatible across all MT wireless products – again not the case with other much more expensive products

# NV2 Master Configuration

Interface <wlan1>

Wireless HT HT MCS WDS Nstreme **NV2** Status Traffic ...

TDMA Period Size: 2ms

Cell Radius: 30 km

Security

Preshared Key: Some Very Strong Secret

Mode: sync master

Downlink Ratio: 50 %

Sync Secret: Sync Me UP!

Queue Count: 2

QoS: default

OK  
Cancel  
Apply  
Disable  
Comment  
Advanced Mode  
Torch  
WPS Accept  
WPS Client

# Common Misconceptions

- Indoor Wireless
  - Product A, B, R and U is so much better – just plug in and go and it just works
  - And it has such a cool Management System – all web based with pretty pictures and everything!
- Have you even seen CAPsMAN?
  - Okay, so no pretty web interface, but it more than makes up for it with one of the most powerful feature sets of any centralised enterprise management system I have ever seen
  - Delivers ultra fine grained control over every aspect of the connected AP's

## CAPsMAN

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

+ - ✓ ✕ 🗨️ ⚙️ Reselect Channel Manager AAA

	Name	Type	MTU	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	FP T
SMB	↔ AP1 - Josmont Heights-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SB	↔ AP1 - Josmont Heights-1-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SMB	↔ AP1 - Josmont Heights-2	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SB	↔ AP1 - Josmont Heights-2-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
MI	↔ AP2 - Villa302-1	CAP Interface	1500			0 bps	0 bps	0	0	
I	↔ AP2 - Villa302-1-1	CAP Interface	1500			0 bps	0 bps	0	0	
MI	↔ AP2 - Villa302-2	CAP Interface	1500			0 bps	0 bps	0	0	
I	↔ AP2 - Villa302-2-1	CAP Interface	1500			0 bps	0 bps	0	0	
SMB	↔ AP3 - GT 112-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SB	↔ AP3 - GT 112-1-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SMB	↔ AP3 - GT 112-2	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SB	↔ AP3 - GT 112-2-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SMB	↔ AP5 - Pool Side-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SB	↔ AP5 - Pool Side-1-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
MI	↔ AP5 - Pool Side-2	CAP Interface	1500			0 bps	0 bps	0	0	
I	↔ AP5 - Pool Side-2-1	CAP Interface	1500			0 bps	0 bps	0	0	
SMB	↔ AP6 - Chalet 13-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SB	↔ AP6 - Chalet 13-1-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
RSMB	↔ AP7 - Chalet 17-1	CAP Interface	1500	1500	1600	4.5 k...	0 bps	4	0	
SB	↔ AP7 - Chalet 17-1-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
MI	↔ AP8 - GT 104-1	CAP Interface	1500			0 bps	0 bps	0	0	
I	↔ AP8 - GT 104-1-1	CAP Interface	1500			0 bps	0 bps	0	0	
SMB	↔ AP9 - Chalet 31-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
SB	↔ AP9 - Chalet 31-1-1	CAP Interface	1500	1500	1600	0 bps	0 bps	0	0	
MI	↔ AP9 - Chalet 31-2	CAP Interface	1500			0 bps	0 bps	0	0	



52 items out of 66

# CAPsMAN Features

- Server runs on any Routerboard with sufficient specification
- Unlimited CAPs (access points) supported by CAPsMAN
- 32 Radios per CAP
- 32 Virtual interfaces per master radio interface
- MAC layer connection features:
  - no IP configuration necessary on CAP
  - CAP and CAPsMAN must be on the same Layer 2 segment - either physical or virtual
- IP layer (UDP) connection features:
  - can traverse NAT if necessary
  - CAP must be able to reach CAPsMAN using IP protocol
- if the CAP is not on the same L2 segment as CAPsMAN, it must be provisioned with the CAPsMAN IP address

# Unrealistic Expectations

- Hardware Specification
- Software Specification
- Reasonable Application



# Hardware Specification

- Most common issue
- Why is my router slow?

# Inadequate Hardware Specification

- HAP Lite

CPU core count	1
CPU nominal frequency	650 MHz
License level	4
Operating System	RouterOS
Size of RAM	32 MB
Storage size	16 MB

- Why can't this run as my PPPoE server with 200 connected clients?
- You would imagine this to be obvious, but apparently not for some

# Understand Your Hardware

- Check the specification – does the hardware suit my application
- Is this device a SOHO router or something built for core / edge router applications
- Could this be handled better on the CHR platform?

# CHR vs CCR

- CCR – Tiler based many CPU cores running at relatively low clock speed
- CHR – X86 based Lower CPU / core count, usually at a much higher speed per CPU

# CCR

- Excellent price vs performance ratio
- Optimal when you need lots of small loads balanced against many CPU's in multithread capable situations
  - Many parent / child queue QOS systems
  - Multiple PPPoE accounts with queues per account
- Multiple ports @ 1gbps and 10gbps
- Low power consumption

# CCR in Action

- <https://www.stubarea51.net/2015/10/23/mikrotik-ccr1072-1g-8s-pppoe-testing-preview-30000-connections-and-queues/>
- 30000 PPPoE connections on CCR1072

The screenshot displays the Mikrotik WinBox interface. The left pane shows the 'PPP' configuration page with a table of active connections. The right pane shows the 'CPU' configuration page with a table of system resources.

**PPP Connections Table:**

Name	Service	Caller ID	Encoding	Address	Uptime
L test	pppoe	00:0C:29:05:...		1.255.225.125	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.140	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.126	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.139	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.139	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.138	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.153	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.137	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.154	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.136	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.155	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.135	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.156	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.134	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.157	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.133	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.163	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.132	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.165	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.131	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.166	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.130	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.167	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.129	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.168	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.128	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.169	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.127	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.170	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.126	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.171	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.125	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.172	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.124	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.173	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.123	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.174	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.122	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.225.175	03:17:21
L test	pppoe	00:0C:29:05:...		1.255.219.121	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.225.177	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.219.120	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.225.186	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.219.119	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.225.187	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.219.118	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.225.188	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.219.117	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.225.189	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.219.116	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.225.198	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.219.115	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.225.200	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.219.114	03:17:20
L test	pppoe	00:0C:29:05:...		1.255.225.201	03:17:20

**CPU Resources Table:**

CPU	Load (%)	IRQ (%)	Disk (%)
cpu13	95	0	0
cpu9	90	0	0
cpu25	71	0	0
cpu66	68	0	0
cpu5	67	0	0
cpu29	67	0	0
cpu41	67	0	0
cpu52	66	0	0
cpu54	66	0	0
cpu71	66	0	0
cpu43	64	1	0
cpu59	64	0	0
cpu62	64	0	0
cpu7	63	0	0
cpu10	63	0	0
cpu36	63	0	0
cpu16	62	0	0
cpu34	62	0	0
cpu1	61	0	0
cpu4	61	0	0
cpu42	61	0	0
cpu46	61	0	0
cpu49	61	0	0
cpu60	60	0	0
cpu63	60	0	0
cpu14	59	3	0
cpu20	58	0	0
cpu45	58	0	0
cpu11	56	0	0
cpu55	56	0	0
cpu18	53	0	0
cpu33	51	0	0
cpu48	26	0	0
cpu40	22	0	0
cpu50	5	0	0
cpu58	4	0	0
cpu0	0	0	0
cpu2	0	0	0
cpu3	0	0	0
cpu6	0	0	0

**System Resources Summary:**

- Uptime: 18:41:42
- Free Memory: 13.1 GiB
- Total Memory: 15.8 GiB
- CPU: tilegx
- CPU Count: 72
- CPU Frequency: 1000 MHz
- CPU Load: 29 %
- Free HDD Space: 876.4 MiB
- Total HDD Size: 1024.0 MiB

# CHR / Bare Metal

- High speed single thread performance
- Excellent for applications that can't / wont use multiple cores effectively
  - BGP Convergence
  - Firewall IDS
  - Layer7 filtering
- Costly
- High power consumption

# CHR and BGP Edge Router

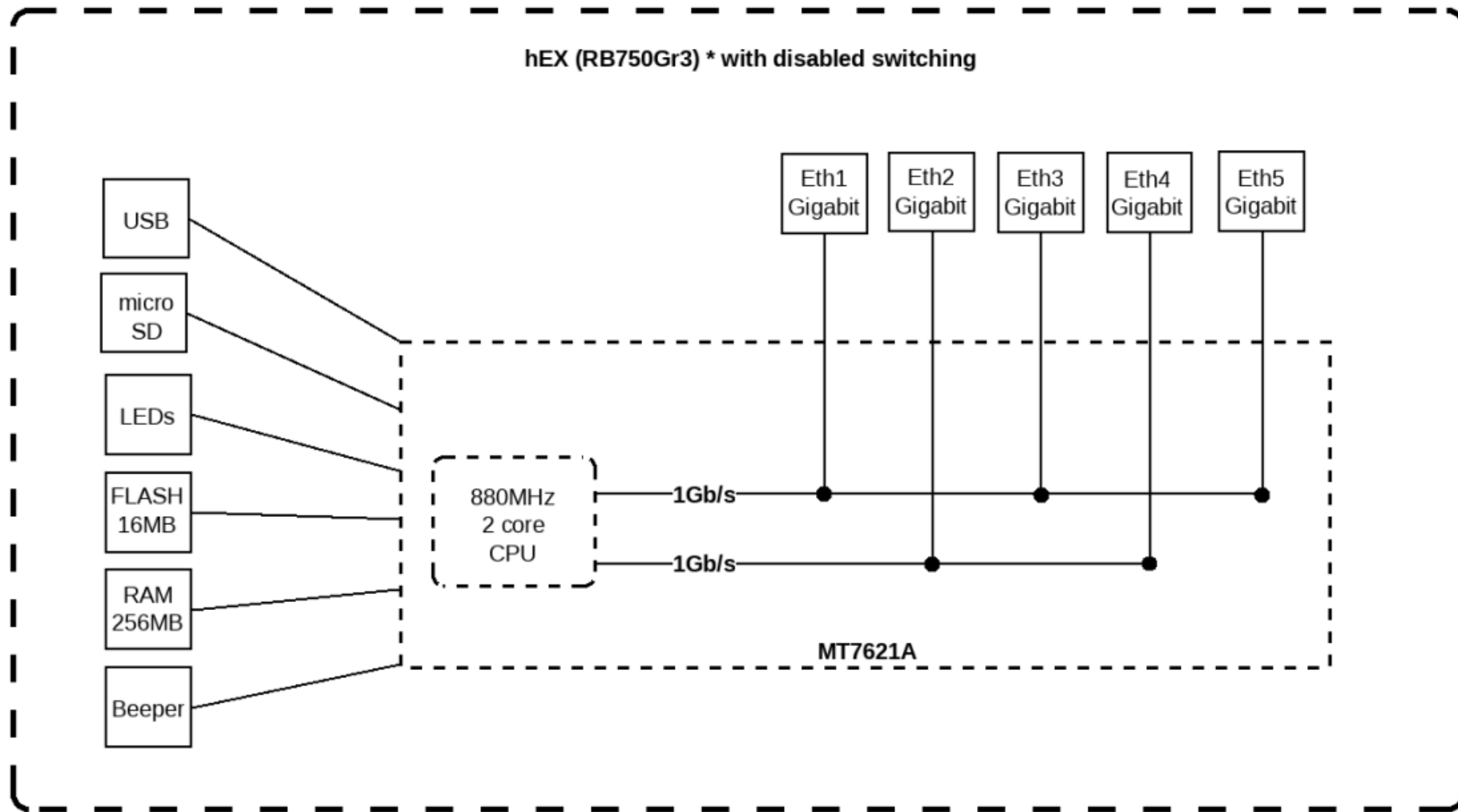
- [https://mum.mikrotik.com/presentations/EU18/presentation\\_5188\\_1524562405.pdf](https://mum.mikrotik.com/presentations/EU18/presentation_5188_1524562405.pdf)
- With thanks to Kevin Meyers from IP Architects
- BGP convergence of 2 routing tables of over 500k routes on HyperV took less than 1 minutes on a high spec CHR
- CCR could take up to 10 minutes for the same computation
- Even the RB4011 can converge significantly faster – higher single thread performance
- Hopefully MikroTik is announcing some exciting new products for this very purpose?



# Lack of Research

- Ties into the previous slide
- My router has slow IPSEC performance
  - Does it support hardware acceleration?
  - Price does not always guarantee performance in a set application
  - [https://wiki.mikrotik.com/wiki/Manual:IP/IPsec#Hardware\\_acceleration](https://wiki.mikrotik.com/wiki/Manual:IP/IPsec#Hardware_acceleration)
- My router has slow bridging / routing performance
  - Have you researched the board architecture?
  - Which ports are connected to which switch chip?
  - Are you using hardware offload?

# RB750Gr3 block diagram 1



Idea for MikroTik: Why not include this diagram in the device packaging?

# Lack of Understanding

- “Just because you can do something, does not mean should”
- Ties into the rest of the presentation
- Yes you can use a low spec router to run BGP, MPLS, Layer-7 filtering
  - Should you?
  - Well that’s your decision, but don’t be surprised when performance does not match expectation
- Many other examples
  - Bandwidth test vs Traffic Generator (vs Speed Test?)
  - Simple queues in the root vs hierarchical / tree structures
  - And so on, examples can be endless

# To Summarise

- Understand what your hardware was built to do
- Apply your software config in a smart way
- Match your application with the correct configuration and router specification
- “I do not hate MikroTik any longer 😊”