



MikroTik User Meeting

Монгол Улс, Улаанбаатар

June 2017



- Established 1996
- RouterOS created in 1997
- RouterBOARD created in 2002
- First MUM event in Prague 2006
- MUM in Indonesia had 2500 people



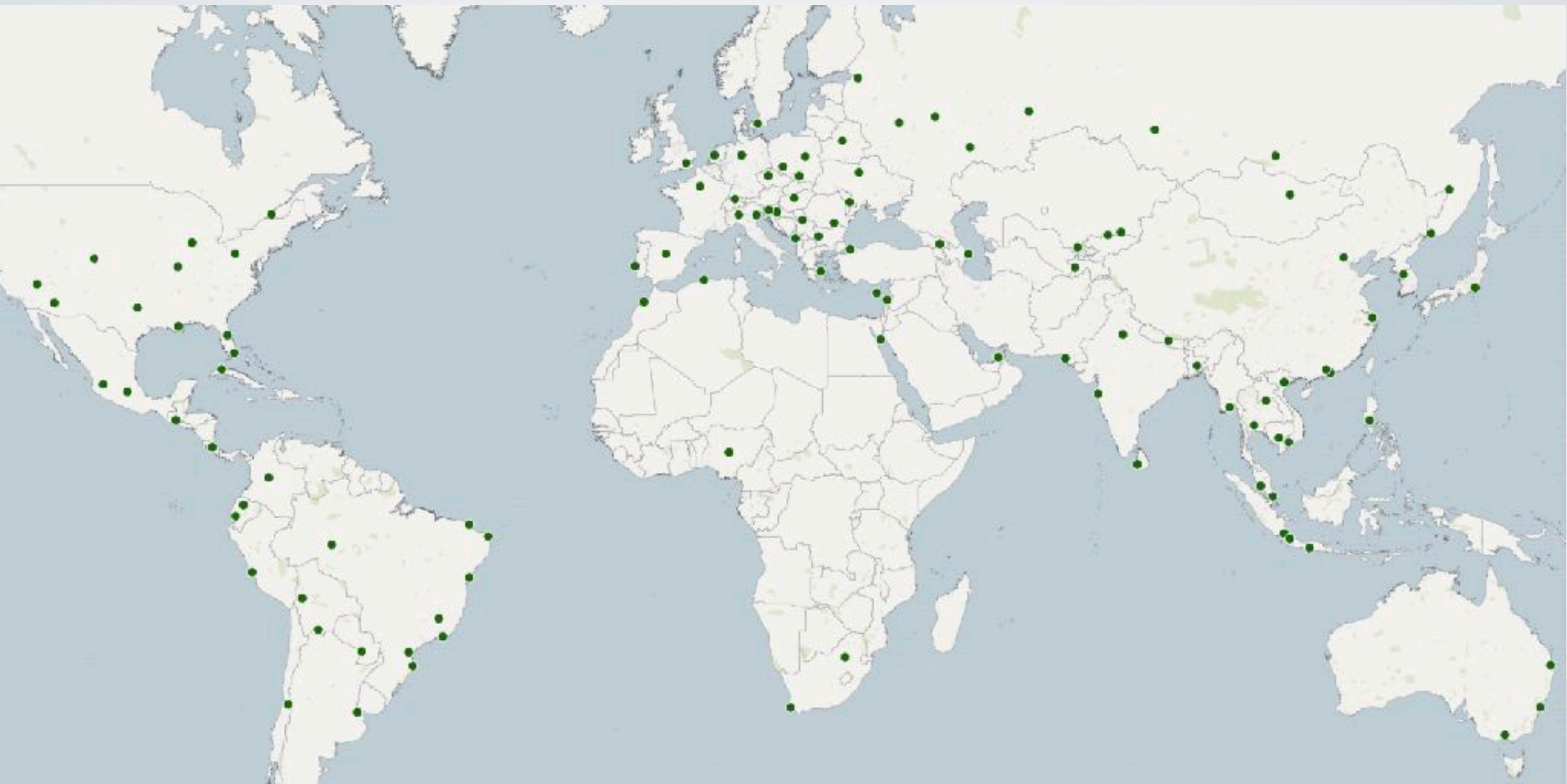
A map of Europe with Latvia highlighted in green. The Mikrotik logo is overlaid on the map, centered over Scandinavia. The word 'LATVIA' is written in large, black, sans-serif capital letters across the center of the map, positioned below the Mikrotik logo and above the word 'LATVIA'.

**Mikrotik**

**LATVIA**



150 MUM events  
all around the world





# MikroTik at the MUM

Martins Kengis (sales)

Maris Bulans (support)

Sergejs Boginskis (support, training)

A red rounded rectangle button with the word STAFF in white capital letters.

STAFF

# Agenda

10:00 AM

Presentations

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13:00

Lunch

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15:45

Lottery and closing of MUM

# MUM live

[www.youtube.com/mikrotik](http://www.youtube.com/mikrotik)



# Special Thanks



Our products include

## **RouterOS**

built and advanced for more than 20 years

## **RouterBOARD**

Wireless outdoor&indoor, Ethernet routers

## **CRS**

Switches with RouterOS

## **CSS**

Switches with SwOS

## Products

### Product categories

All products

Ethernet routers

Switches

Wireless systems

Wireless for home and office

RouterBOARD

Enclosures

Interfaces

Accessories

Antennas

### Product filters

Show

### Useful links

- Product catalog (PDF)
- What is RouterOS?

### Ethernet routers



#### hEX lite

5x Ethernet, Small plastic case, 850MHz CPU, 64MB RAM, Most affordable MPLS router, RouterOS L4



\$39.95



#### hEX

5x Gigabit Ethernet, Dual Core 880MHz CPU, 256MB RAM, USB, microSD, RouterOS L4



\$59.95



#### hEX PoE lite

5x Ethernet with PoE output for four ports, USB, 650MHz CPU, 64MB RAM, RouterOS L4



\$59.95

## Products

[HOME](#) / [ETHERNET ROUTERS](#) / [HEX LITE](#)

## hEX lite



The RB750r2 (hEX lite) is a small five port ethernet router in a nice plastic case.

Its price is lower than the RouterOS license alone - there simply is no choice when it comes to managing your wired home network, the RB750r2 (hEX lite) has it all.

Not only it's affordable, small, good looking and easy to use - It's probably the most affordable MPLS capable router on the market! No more compromise between price and features - RB750r2 has both. With its compact design and clean looks, it will fit perfectly into any SOHO environment.

Box contains: RB750r2 in a plastic case, power supply

[Quick Guide](#)[Brochure](#)

## More info

- [Design Files DXF-PDF](#)
- [Block Diagram](#)
- [User Guide](#)
- [STEP file for CAD](#)
- [High-res image: \[1\] \[2\]](#)
- [Send purchase questions](#)
- [RouterOS software manual](#)
- [Declaration of conformity \(CE\)](#)

## Product specifications

| Details          |          |
|------------------|----------|
| Product code     | RB750r2  |
| Architecture     | MIPS-BE  |
| CPU core count   | 1        |
| Operating System | RouterOS |



## Products



12V 0.5A power adapter

## Ethernet test results

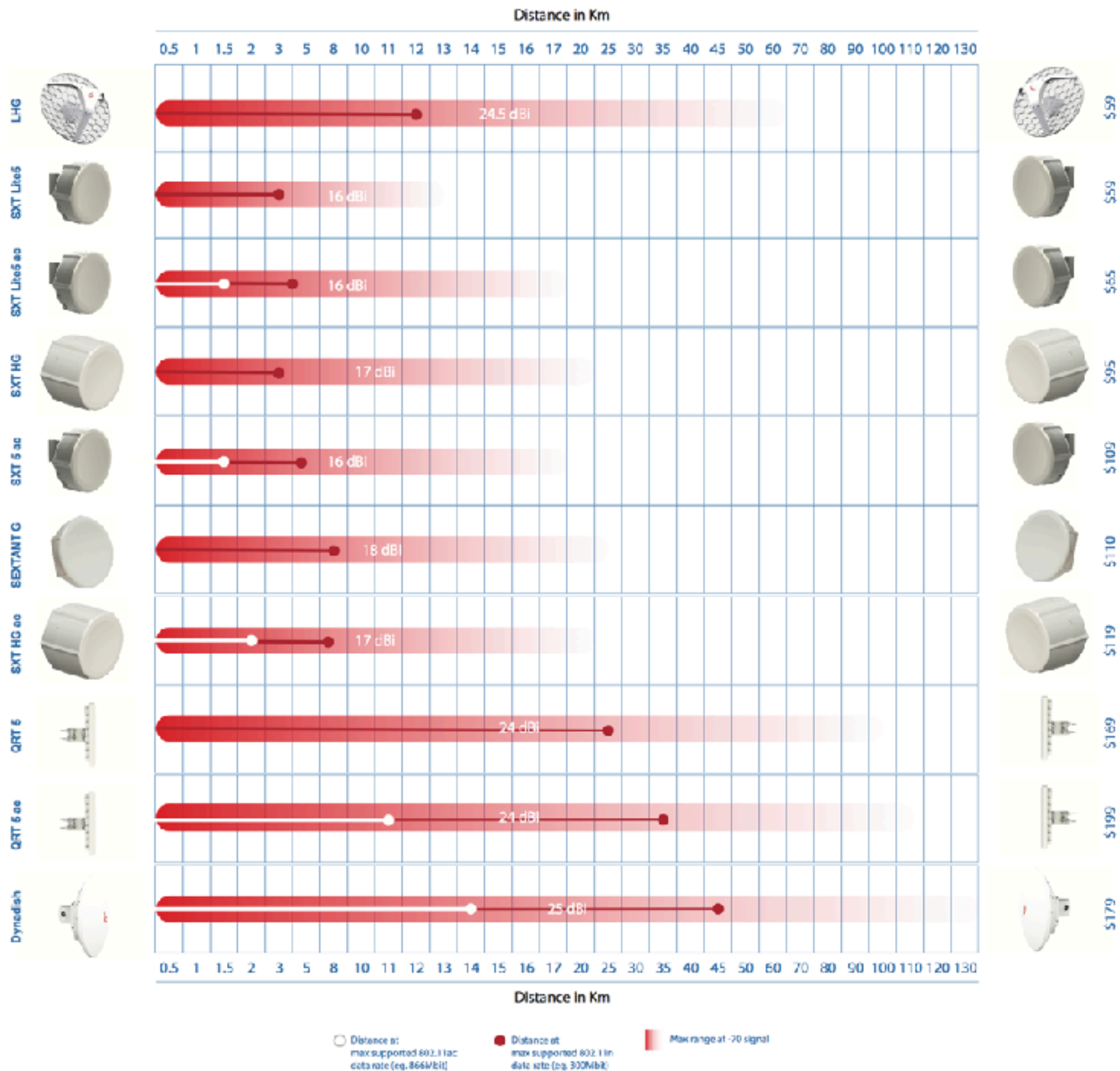
| RB750r2  |                        | QCA9531 (850Mhz) 100M all port test |       |          |       |         |       |
|----------|------------------------|-------------------------------------|-------|----------|-------|---------|-------|
| Mode     | Configuration          | 1518 byte                           |       | 512 byte |       | 64 byte |       |
|          |                        | kpps                                | Mbps  | kpps     | Mbps  | kpps    | Mbps  |
| Bridging | none (fast path)       | 40.6                                | 493.0 | 117.4    | 480.9 | 234.8   | 120.2 |
| Bridging | 25 bridge filter rules | 40.6                                | 493.0 | 90.4     | 370.3 | 94.3    | 48.3  |
| Routing  | none (fast path)       | 40.6                                | 493.0 | 117.4    | 480.9 | 217.8   | 111.5 |
| Routing  | 25 simple queues       | 40.6                                | 493.0 | 98.9     | 405.1 | 101.2   | 51.8  |
| Routing  | 25 ip filter rules     | 40.6                                | 493.0 | 52.0     | 213.0 | 52.7    | 27.0  |

1. All tests are done with Xena Networks specialized test equipment (XenaBay), and done according to RFC2544 (Xena2544)
2. Max throughput is determined with 30+ second attempts with 0,1% packet loss tolerance in 64, 512, 1518 byte packet sizes
3. Values in *italic* indicate that max throughput was reached without maxing out CPU, but because board interface configuration was maxed out
4. Test results show device maximum performance, and are reached using mentioned hardware and software configuration, different configurations most likely will result in lower results

# RouterBOARD naming

- Series name, hEX PoE
- <board name> <board features>-<built-in wireless> <wireless card features>-<connector type>-<enclosure type>, RB960PGS
- 9 - series, 6 ports, P - power, G - Gigabit, S - SFP

# Wireless systems



Note: line of sight, interference, alignment, weather and other outside factors will affect the wireless link performance and possible distance

# Disc Lite5

- 5GHz antenna
- 21dBi, 802.11n 300Mbps
- Power supply, PoE and mounting included
- For CPE and PtP links
- RouterOS inside
- Recommended price \$48



# SXT Lite2, SXT Lite5

- 2GHz, 10 dBi
- 5GHz, 16, dBi
- 300Mbps, 802.11n
- CPE device
- All included in a box
- RouterOS inside





# LHG 5

- 5GHz, 24.5 dBi
- 300Mbps, 802.11n
- CPE device
- All included
- RouterOS inside



# SXT Lite5 ac

- 5GHz, 16 dBi, 28 beam width
- 867Mbps, 802.11ac
- CPE device
- RouterOS inside



# SXT 2, SXT 5

- 2GHz, 10 dBi, 60 degrees
- 5GHz, 16dBi, 60 degrees
- 300Mbps 802.11n
- CPE device
- 1250mW



# SXT 6

- 6GHz, 16 dBi, 28 degree
- 300Mbps, 802.11n
- Access Point





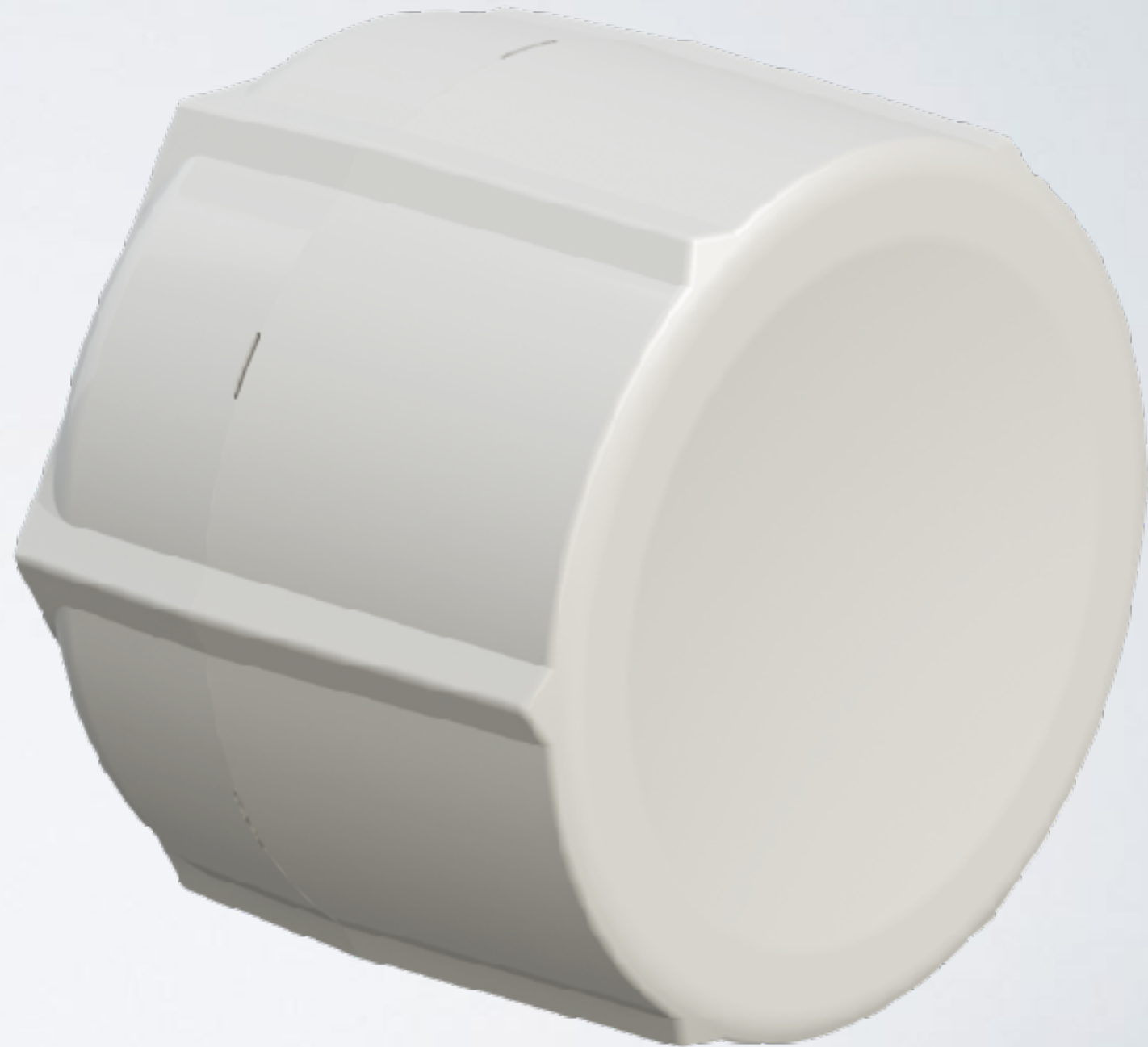
# Groove 52 ac

- 5GHz, attach your antenna
- Omni antenna is included
- 433Mbps, 802.11ac
- CPE device
- Gigabit Ethernet



# SXT LTE

- LTE modem 3/7 and antenna
- miniSIM slot
- 100Mbps port





# Basebox 2, Basebox 5

- 2GHz, SMA connectors
- 5GHz, RPSMA connectors
- 1000mW
- Access Point
- minipci-e port



# Metal 52 ac

- Selection of 2GHz or 5GHz
- 433Mbps, 802.11ac
- 1300mW
- N-male connector
- Access Point device
- 6dBi omni antenna included



# QRT 2, QRT 5

- 2GHz, 17 dBi, 3166mW
- 5GHz, 24 dBi, 1000mW
- 300Mbps, 802.11n
- Access Point
- 1 Gigabit interface
- QRT 5 ac is available



# Dynadish 5

- 5GHz, 25 dBi
- 867Mbps 802.11ac
- CPE



# NetMetal 5

- 5GHz,
- 867 or 1300Mbps, 802.11ac
- Access Point
- One SFP port
- RP-SMA connectors



# mANTBox 15s, mANTBox 19s

- 5GHz
- 15s, 15dBi, 31 dBm, 120 degrees
- 19s, 19dBi, 31 dBm, 120 degrees
- Access Point
- RouterOS inside





# Omnitik 5 ac, Omnitik 5 ac PoE

- 5GHz, 7.5 dBi, 1300mW
- 867Mbps, 802.11ac
- Access Point
- 5 Gigabit ports
- model with 4 PoE-out ports



# LDF 5

- Built-in antenna to be installed on offset dish
- 100cm dish amplification 33dBi
- CPE
- 300Mbps, 802.11n



Wireless for home and office

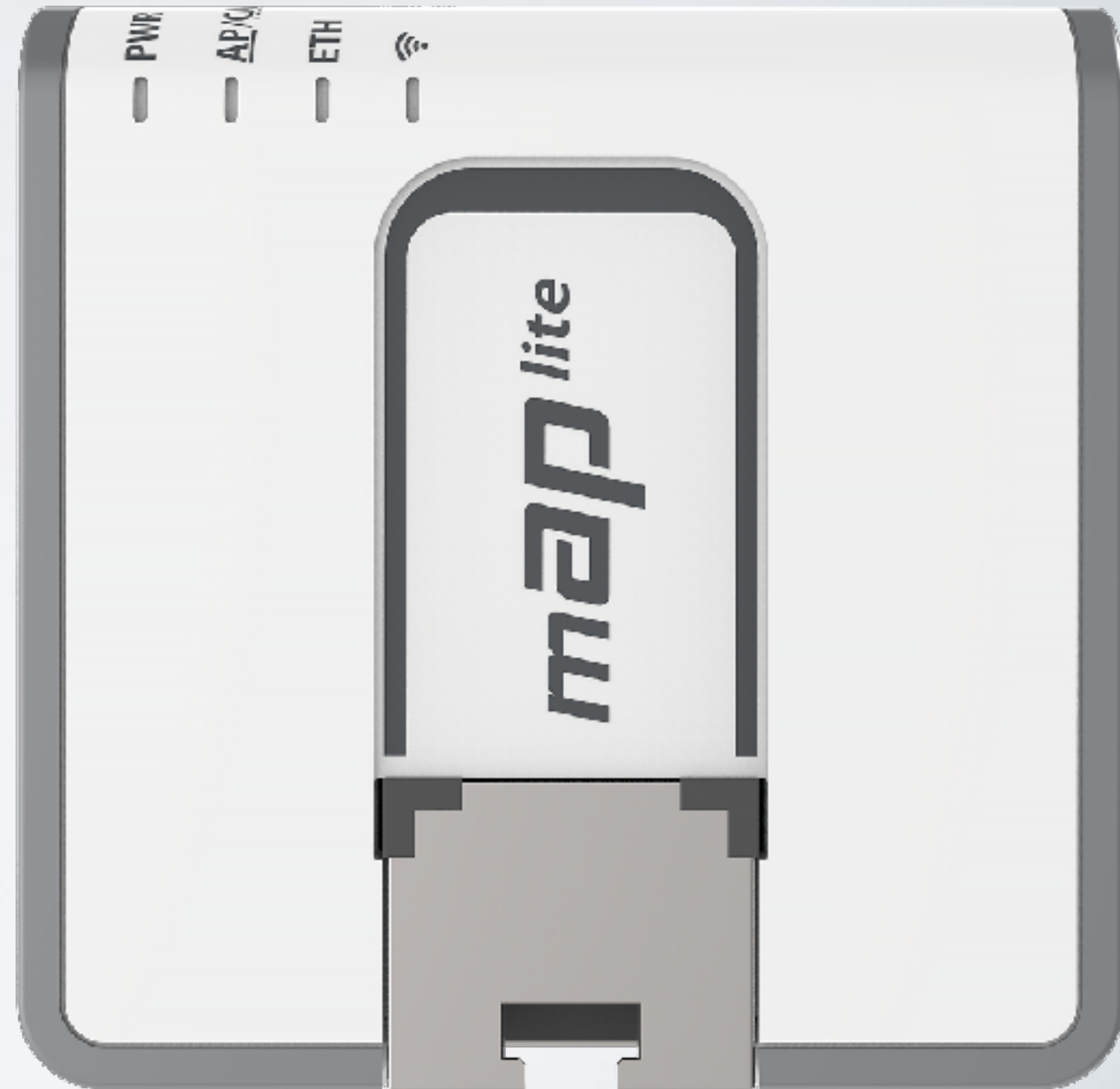
# hAP lite

- 2.4 GHz, access point
- USB power supply
- WPS support
- 300Mbps, 802.11n
- 4 Fast Ethernet ports



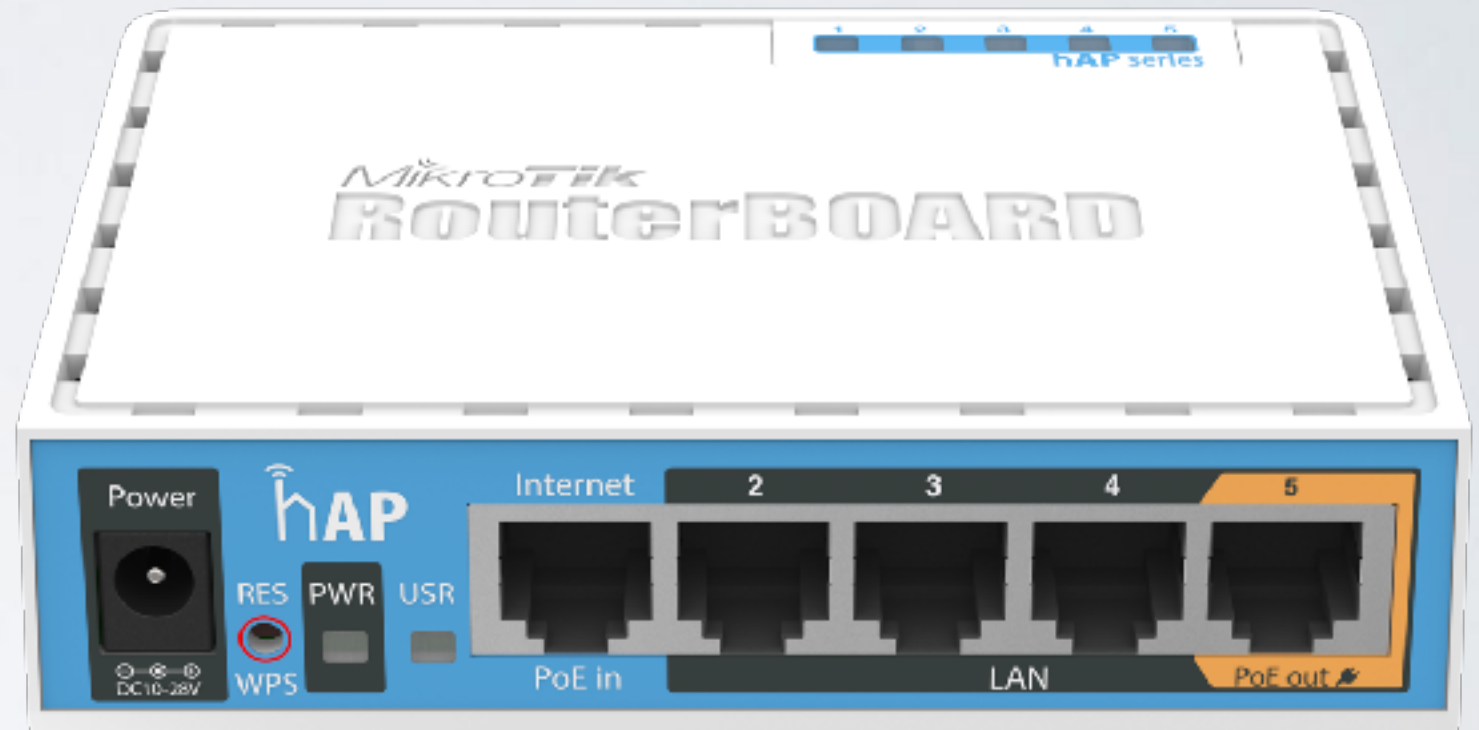
# mAP lite

- Smallest AP
- 2.4GHz, 1.5 antenna gain
- 300Mbps, 802.11n



# hAP

- 2.4GHz
- Access Point
- 5 Fast Ethernet ports
- PoE-out on 5 port
- USB port for 3G/4G





# wAP, wAP AC

- 2.4 GHz AP
- 2.4/5GHz AP
- 802.11b/g/n and ac
- Weatherproof AP



# hAP ac lite

- 2.4GHz and 5GHz Access Point
- 867Mbps and 433Mbps
- USB port
- 5 Fast Ethernet ports



# hAP AC

- 2.4GHz and 5GHz AP
- 1300Mbps
- USB
- SFP port
- 5 Gigabit ports



# Ethernet routers



# hEX

- 5 Gigabit ports
- 880MHz dual core
- 1980Mbps throughput
- IPSec acceleration, 500Mbps
- Very affordable





# hEX PoE

- 5 Gigabit ports
- PoE out on 2-5, 802.3 af/at
- 1A per port
- CPU 800MHz
- SFP port





# RB2011

- Desktop and rackmount
- 5 Gigabit ports
- 5 Fast Ethernet ports
- SFP port
- LCD panel
- USB port



# RB 1100AHx2

- CPU 1 GHz, Dual core
- 13 Gigabit ports
- Extreme performance
- IPSec acceleration 800Mbps



# CCR boards

9 cores  
16 cores  
36 cores  
72 cores

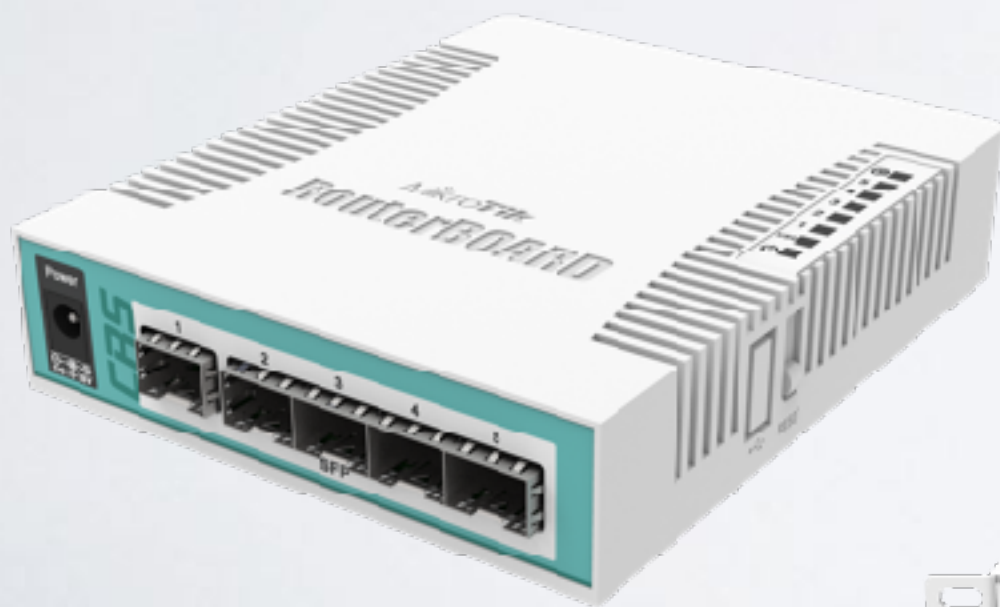


# CCR boards

- The most powerful boards
- Up to 80Gbps of traffic
- Ethernet/SFP ports
- 1 Gigabit, 10 Gigabit ports
- Desktop and rackmount
- Passive cooling option
- IPSec acceleration

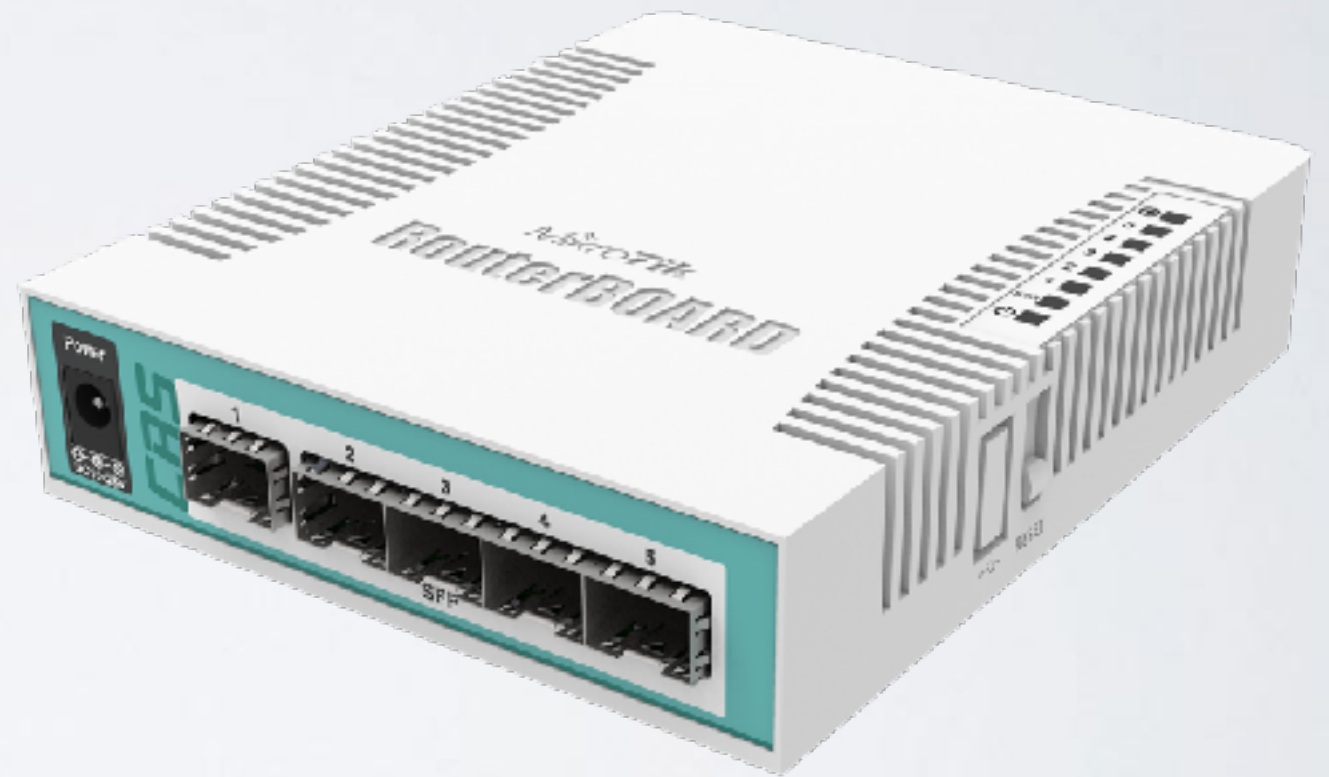


# Switches



# CRS106-1C-5S

- Desktop size switch
- 400MHz CPU
- RouterOS inside, L3 features
- 5 SFP ports, 1 combo port
- Wire speed on switching





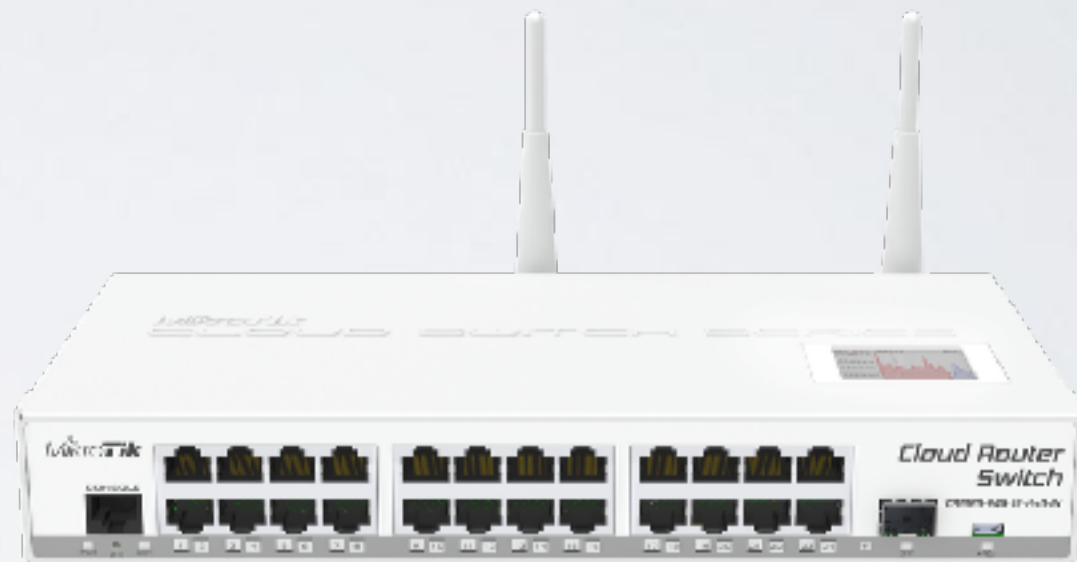
# CRS112-8G-4S-IN

- Desktop size switch
- 400MHz
- 8 Gigabit ports
- 4 SFP ports
- Wire speed on switching



# CRS 125

- Desktop and rackmount
- 600MHz
- 24 Gigabit ports
- 1 SFP port
- Model with wireless interface



# CRS-212-1G-10S-1+IN

- Desktop switch
- 10SFP ports
- 1 SFP+ port
- 1 Gigabit port
- L3 features



# CRS226-24G-2S+RM

- Rackmount switch
- 24 Gigabit ports
- 2 SFP ports
- L3 features
- Wire speed on switching

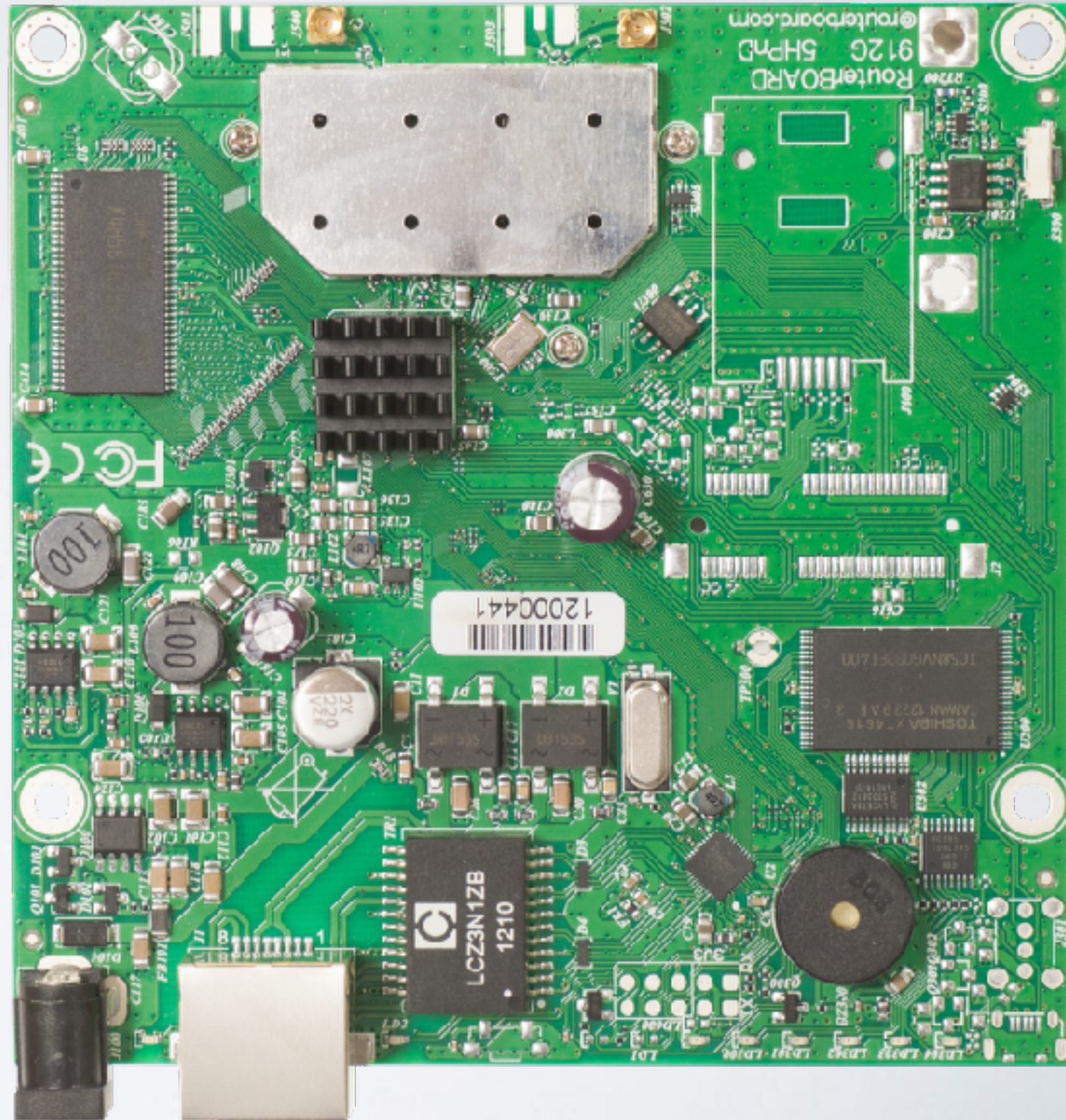


# RouterBOARDS



# 911 series

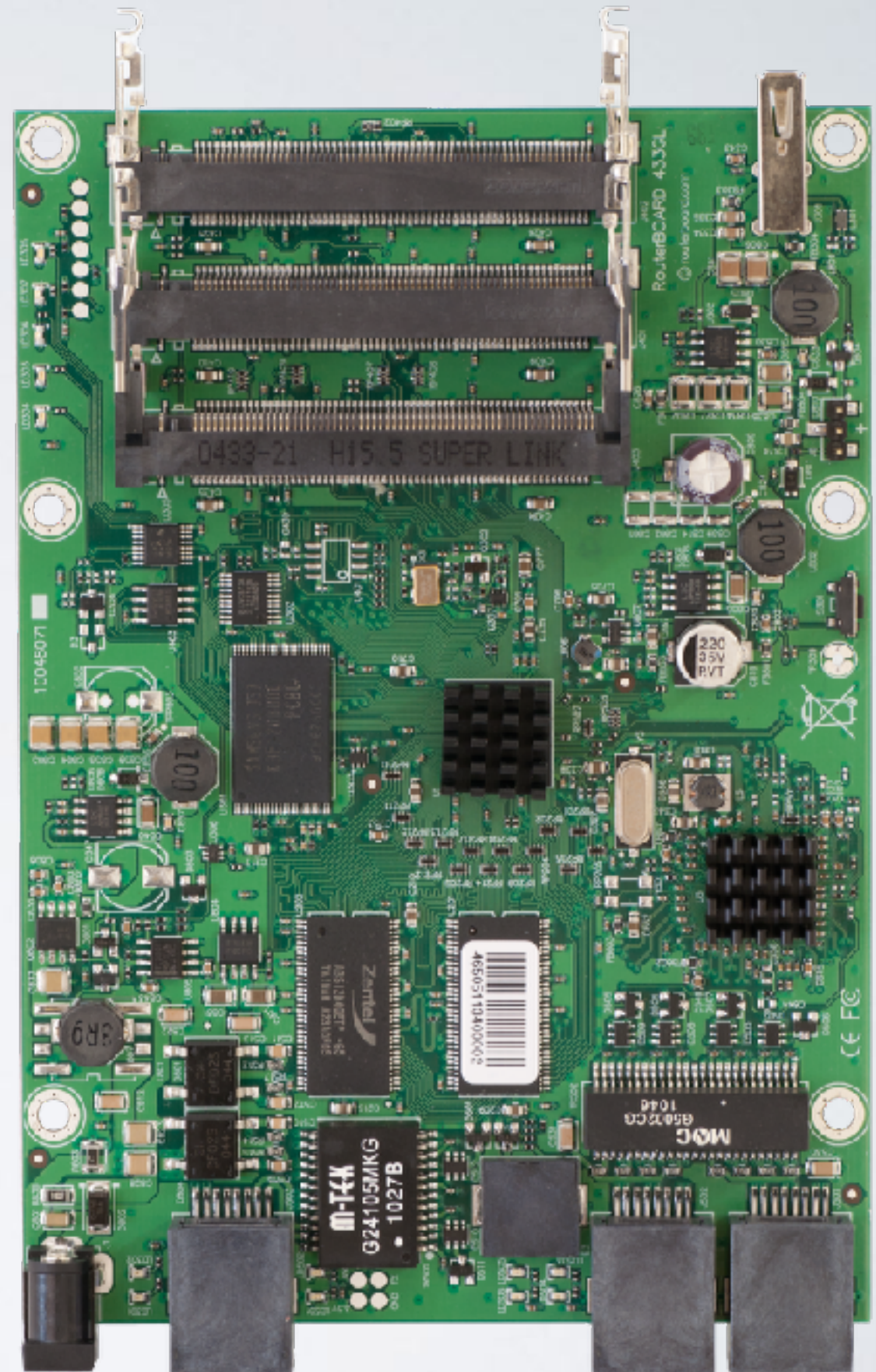
- Make your own case
- Various number of models
- Wireless interface
- minipci-e
- USB





# 433 series

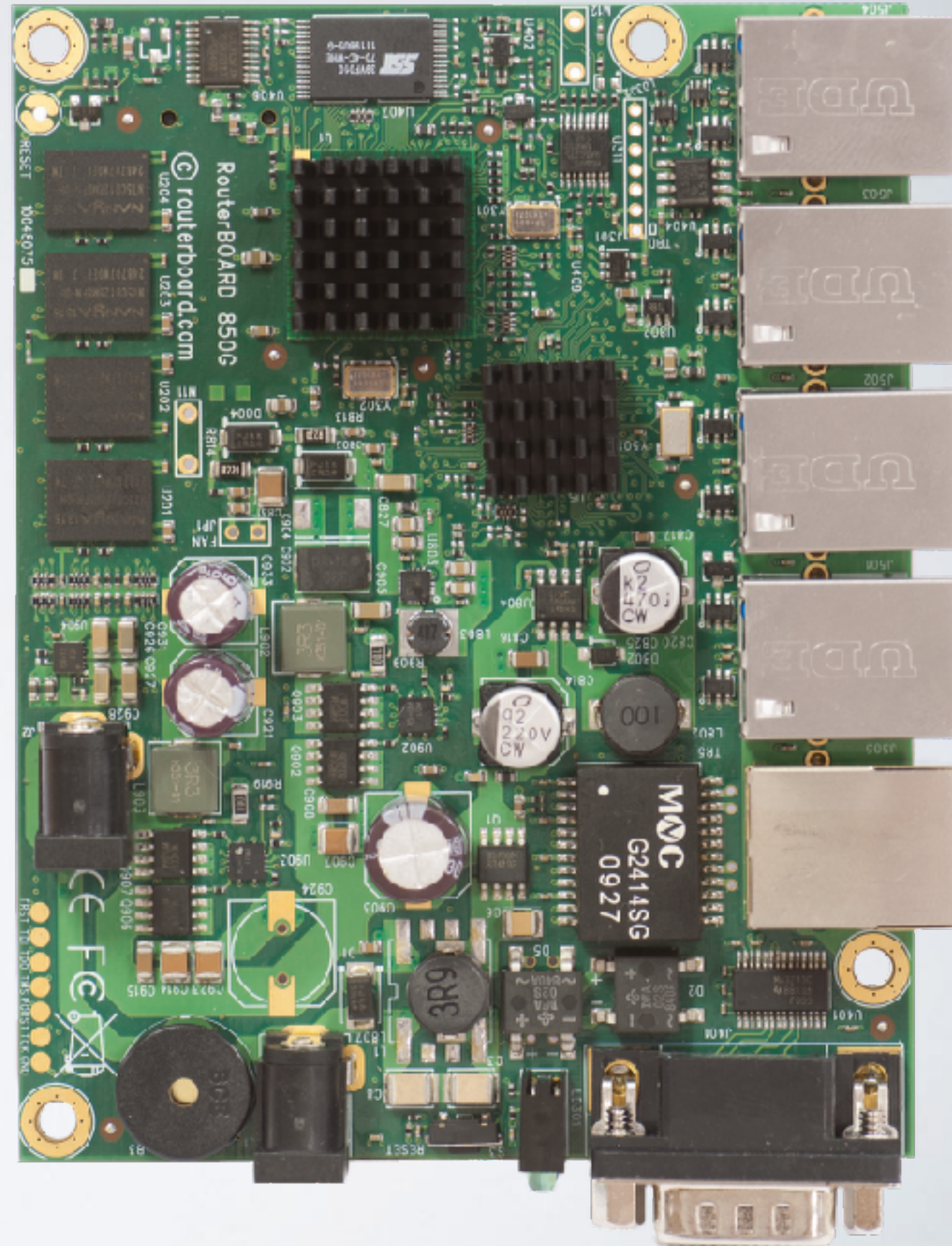
- 3 Gigabit ports
- 3 wireless miniPCI interfaces
- Other features





# RB850Gx2

- Dual core CPU
- 5 Gigabit ports
- Small and fast router



# Antennas and interfaces

# mANT 30

- 5GHz 30 dBi antenna
- For Basebox or any other
- For very long range wireless links





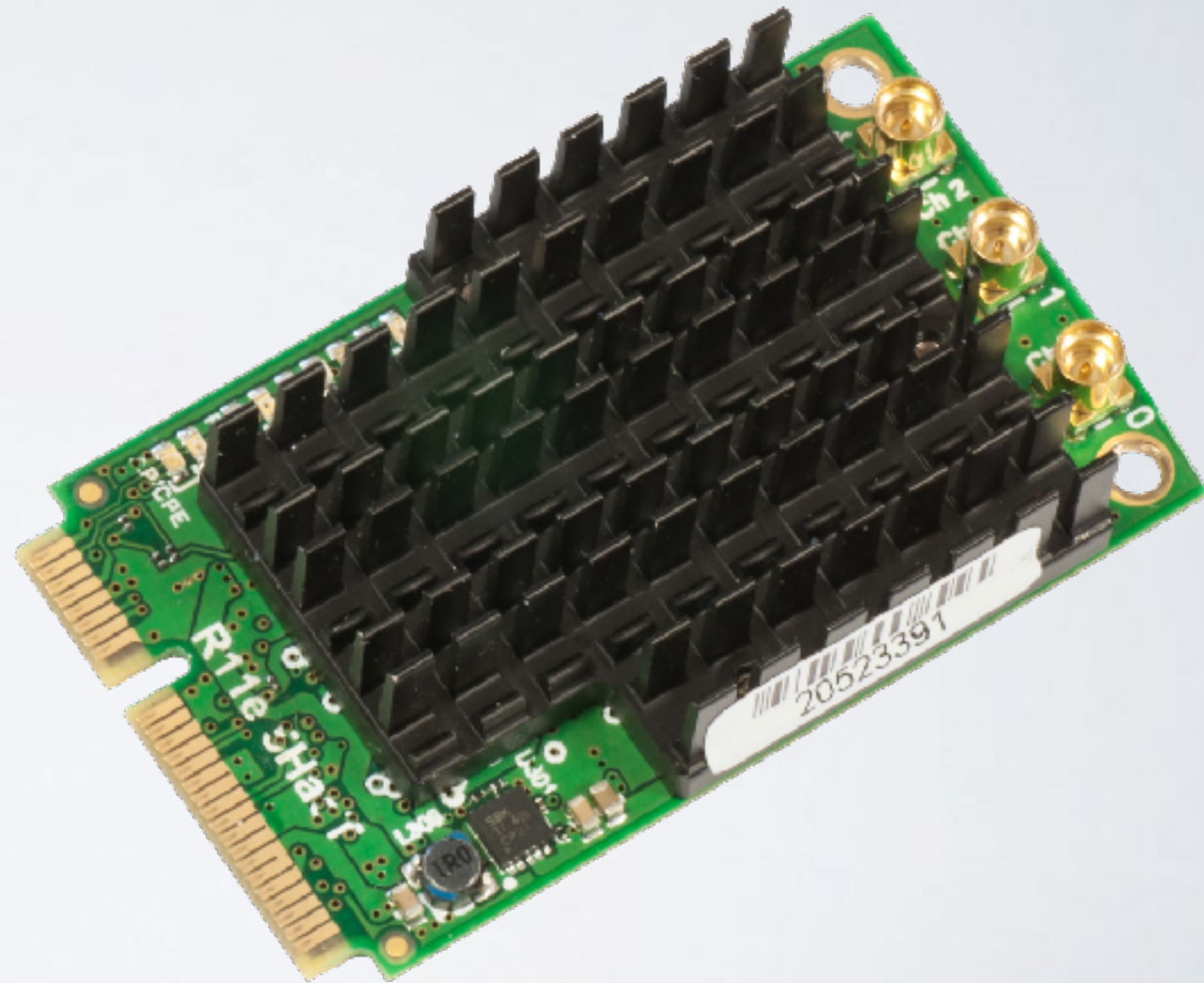
# SFP modules

- Different kinds of SFP modules
- Singlemode/multimode
- 1.25G, 10G
- Short and long range



# Wireless cards

- 2GHz and 5GHz
- miniPCI, minipci-e
- Different power range
- 802.11n and 802.11ac





New products

# cAP lite

- Small and light 2.4GHz AP
- Case can be changed
- Print your own cases
- Perfect for hotel, public areas and extending networks in your house







# CRS326-24G-2S+RM

Multiport dual boot RouterOS/SwOS switch

# DynaDish 6 and SXT 6

- Great for use in less used 6GHz spectrum
- Same familiar designs







# CRS317-1G-16S+

high performance SFP+ switch

# CRS317-1G-16S+

- 16 SFP+ ports
- Next generation switching chip
- Wire speed for all 10GbE ports
- Hardware-based Spanning Tree Protocol
- Dual boot SwOS or RouterOS

# wAP LTE kit

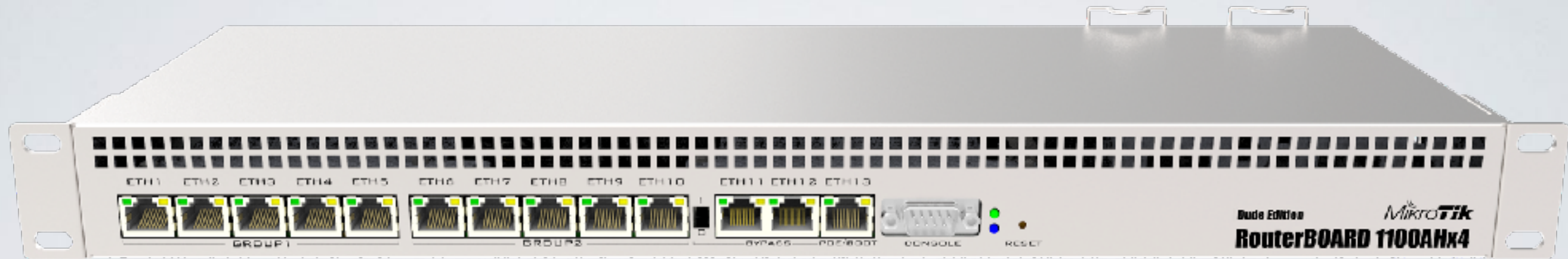
- Wireless AP for LTE
- EU/Int version supports LTE bands 1,2,3,7,8,20,38,40
- 2G, 3G, LTE supported
- Optional external antennas
- Comes with a stand mount



# hAP mini

- Tiny 2GHz AP with three ports
- Upright design in new colours
- Only 8cm tall
- Two LAN ports, one WAN
- Configure differently if needed





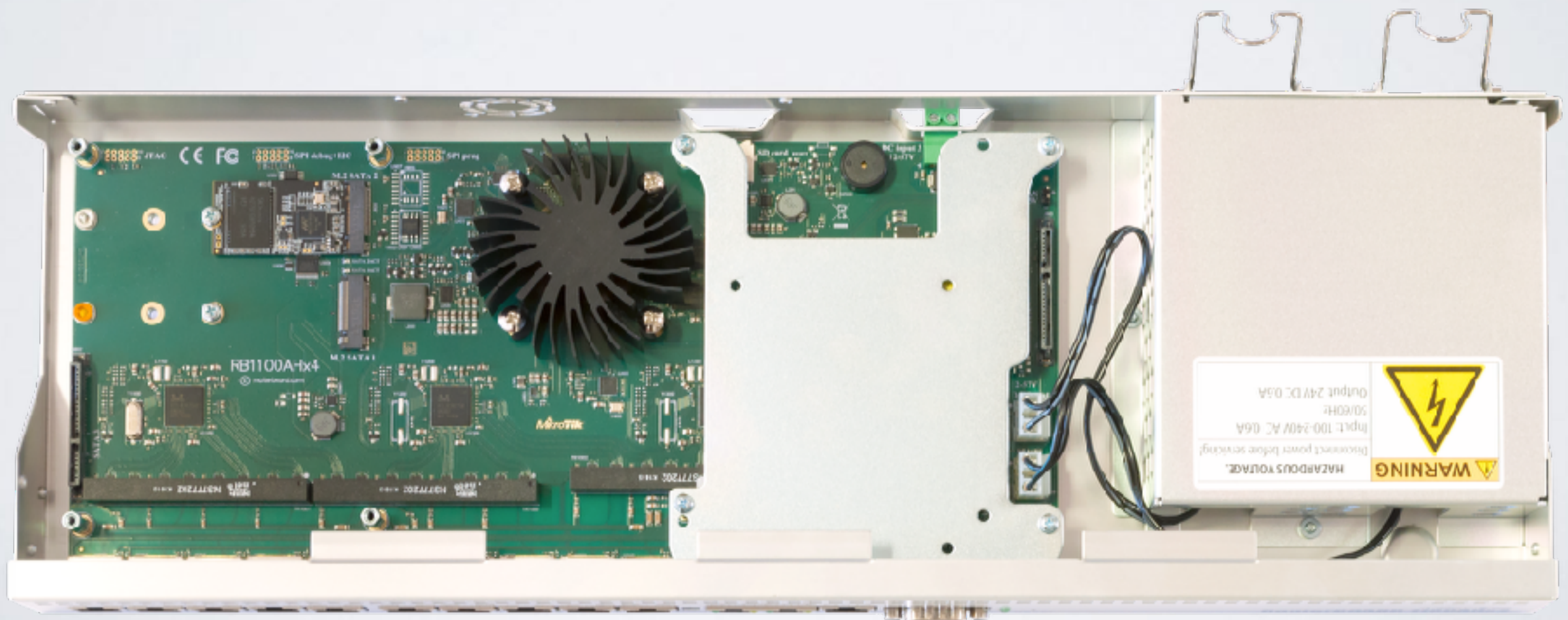
# RB 1100AHx4

The timeless classic upgraded  
with a new quad core CPU and more



# Annapurna Alpine AL21400 CPU with four Cortex A15 cores clocked at 1.4 GHz

- Two SATA3 ports
- Two M.2 ports
- 60GB SSD included
- Accelerated IPsec
- -48V DC telecom power
- Dual PSU





- 5.5 million PPS
- 7.5Gbps
- IPsec up to 2.2Gbps with AES 128
- Overclock up to 2GHz

# Two editions

- **RBI I 00AHx4**
- **RBI I 00AHx4 Dude edition**  
includes 2x M.2 and 2x SATA3 ports

# PowerBox Pro

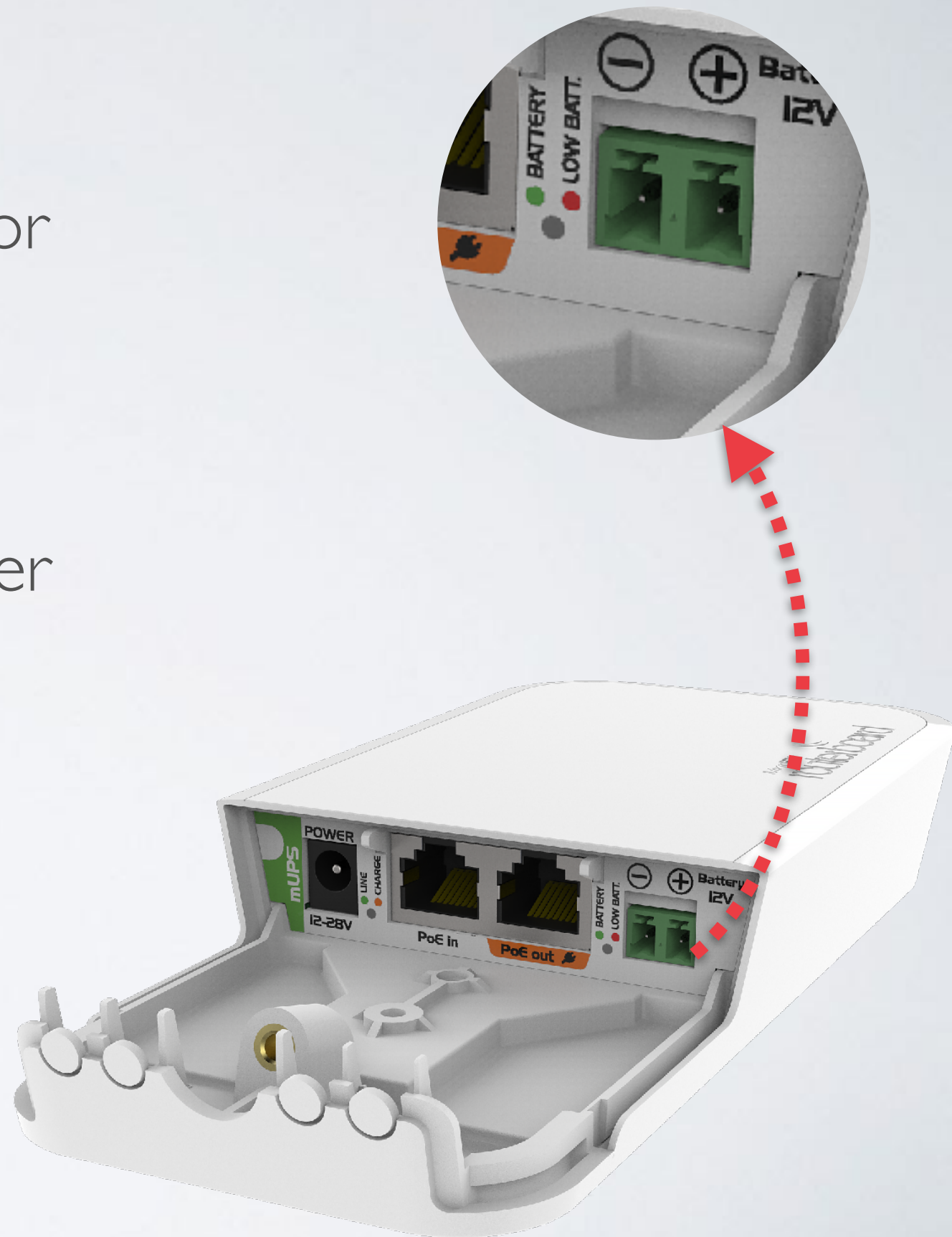
- Gigabit ethernet ports
- PoE output for your CPEs
- Same as hEX PoE
- Supports 802.3af/at
- SFP for fiber to the tower (FttT)
- Improved design





# mUPS

- Just like a smart PoE injector
- Battery connector for 12V batteries (external)
- Battery kicks in when power is lost
- Step up converter keeps device going even if the voltage differs
- Can charge and monitor





# LtAP mini

- 2.4GHz AP in a rugged case
- miniPCle for LTE (2x SIM)
- Built in GPS
- Serial port for other devices
- Perfect for cars or outdoor mobile applications





# LtAP

- 2x miniPCle
- Built in 2.4GHz AP
- MMIPS Mediatek CPU 880MHz
- 2x MMCX connectors
- Built in GPS





# wsAP ac lite

- Mount into standard EU or US electrical sockets
- Dual band ac (2.4 and 5GHz)
- Phone jack passthrough
- Two LAN ports
- USB for charging cell phones









# wAP 60G

- 1 Gbit full duplex (wire speed)
- Works in 60GHz spectrum
- “Wireless wire” kit preconfigured
- Quad-core ARM CPU
- Targeted for up to 100m distances



# LHG 60G

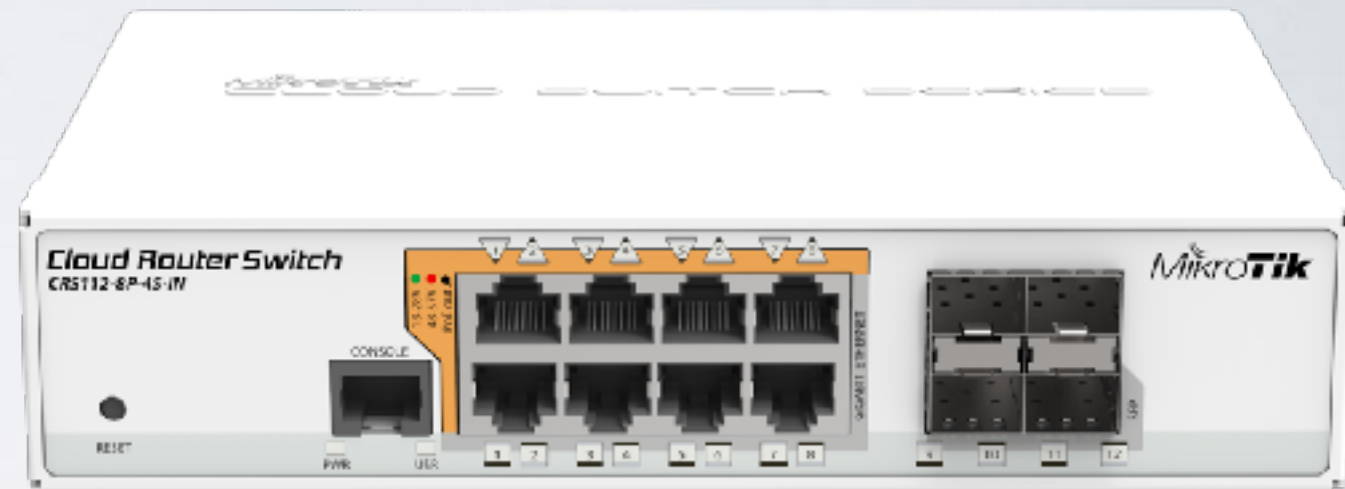
- 1 Gbit full duplex (wire speed)
- Works in 60GHz spectrum
- Familiar LHG design
- Quad-core ARM CPU
- Low cost and low weight
- Targeted for longer distances than 100m



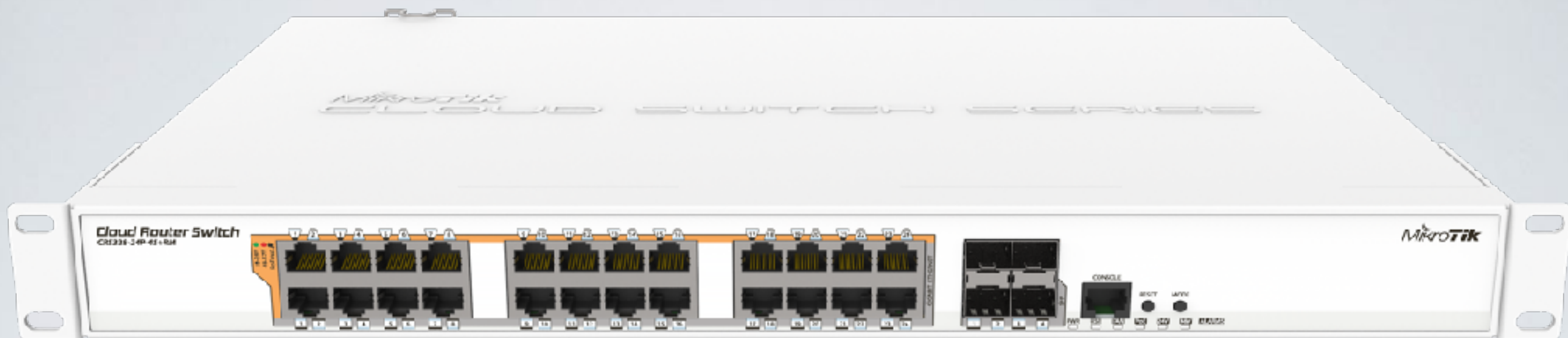


# CRS112-8P-4S

- PoE out 802.3af/at
- Eight Gigabit ethernet ports
- Separate PSU for passive or 802.3af/at PoE out
- Low voltage PSU included
- Per port auto detection of PoE standard
- Four SFP ports







# CRS328-24P-4S+RM

PoE out switch

# CRS328-24P-4S+RM

- Dual boot SwOS or RouterOS
- 24 ports with PoE out function
- Supports 802.3af/at output
- Per port auto detection of PoE standard
- Four SFP+ ports for 10GbE
- One 120/220V IEC connector

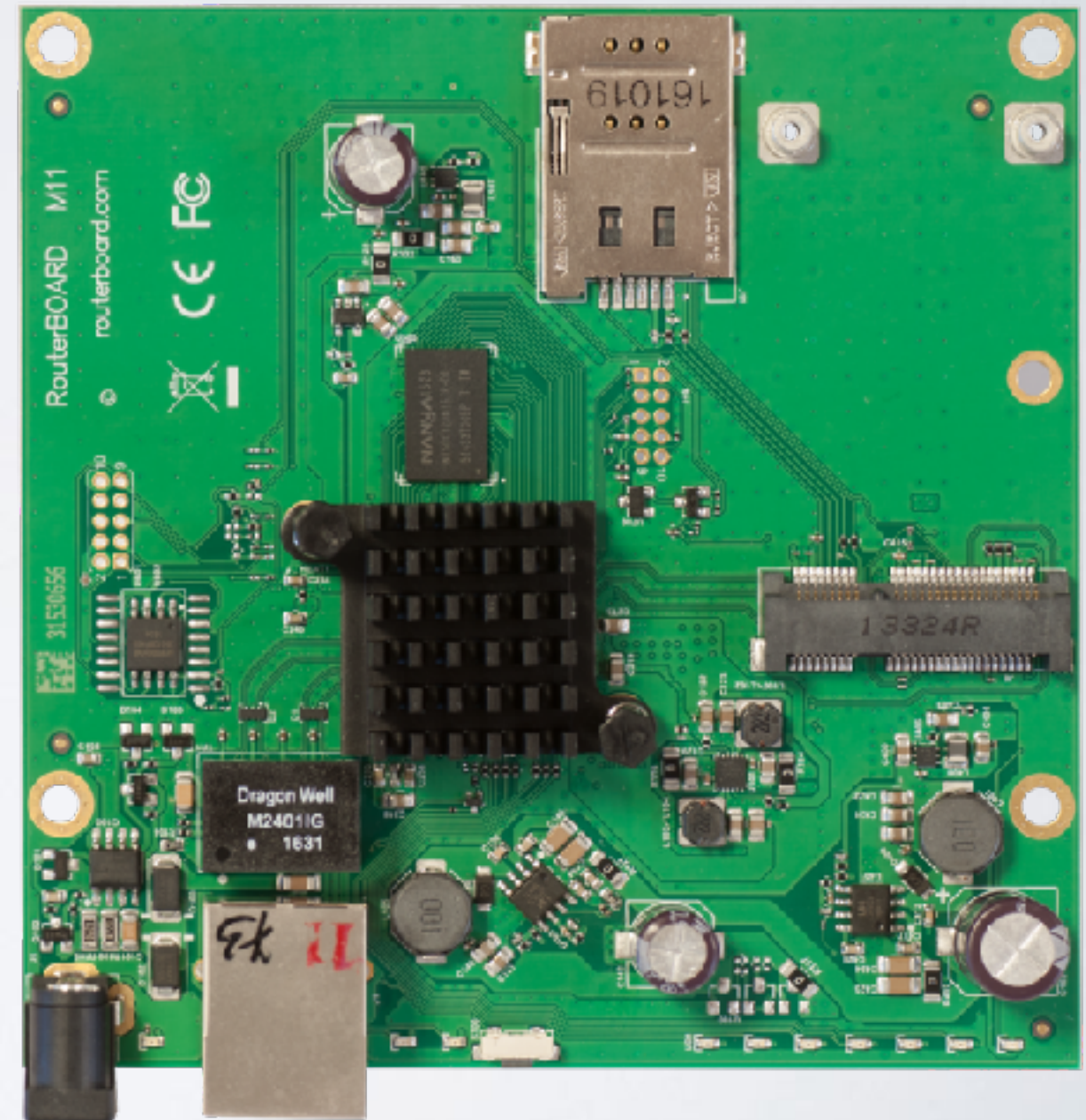
# Woobm

- Wireless out of band management (Woobm)
- Plug into a device to have a new management AP
- Can work as client to use in CCR rackmounts



# M11

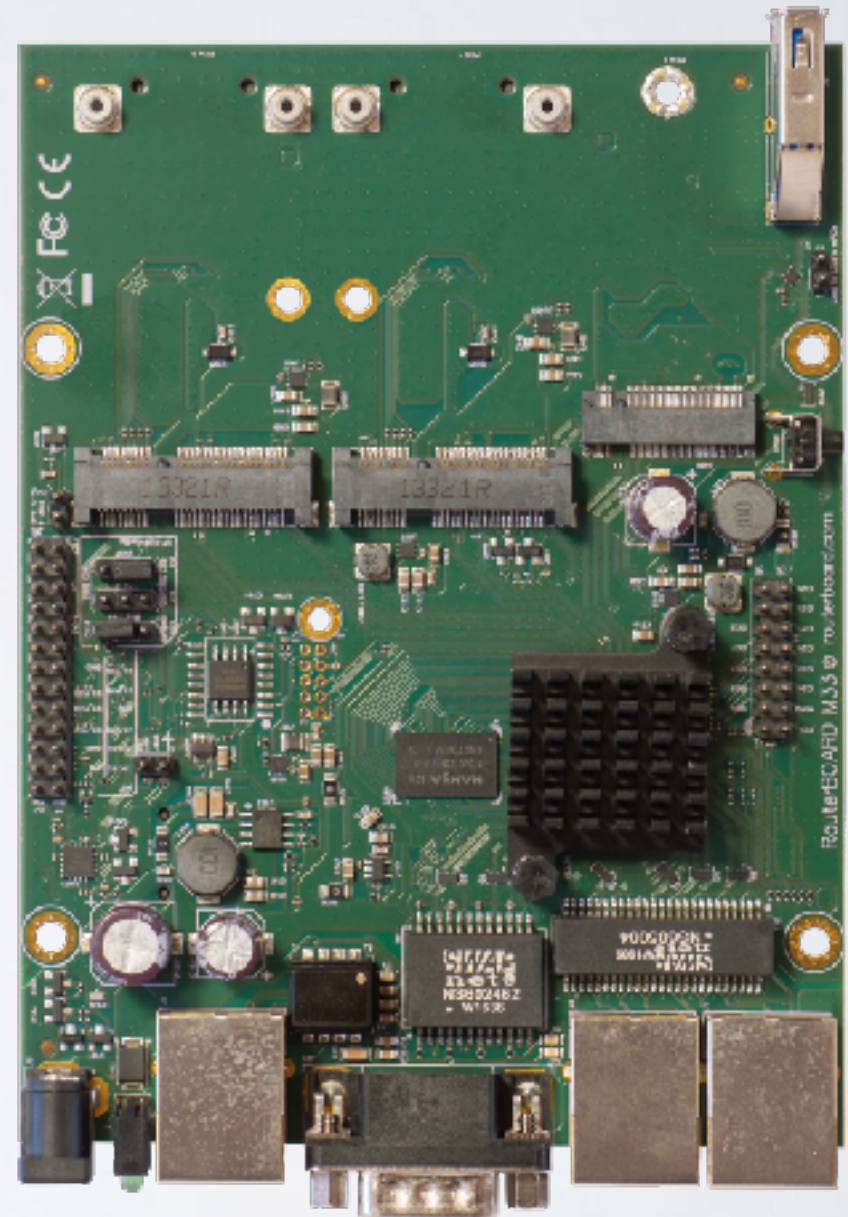
- Four core 880MHz CPU
- 1 miniPCle slot
- 1 Gigabit ethernet
- Upgrade for RB411





# M33

- Four core 880MHz CPU
- 3 Gigabit ethernet
- 2 miniPCle slots
- 1 M.2 slot
- USB 3.0 and serial port
- Upgrade for RB433





# All Products

- Include free software upgrades for life
- Run the same RouterOS software
- For more info see **[routerboard.com](http://routerboard.com)**

# ROUTEROS FEATURES

# CHR

## Cloud Hosted Router

- RouterOS version tailored for running in virtual environments
- Runs on VMware Workstation and ESXi, VirtualBox, HyperV, KVM, XenServer, etc.
- Cloud services - Amazon, Azure and others

# CHR

## Use cases

- Firewall for your cloud services
- VPN server in the cloud
- The Dude monitoring server
- Simulate networks for learning or training
- And many more

# CHR

## Licensing

| License     | Speed limit | Price   |
|-------------|-------------|---------|
| Free        | 1 Mbit      | FREE    |
| P1          | 1 Gbit      | US\$45  |
| P10         | 10Gbit      | US\$95  |
| P-Unlimited | Unlimited   | US\$250 |

- 60 day trial available
- Purchased license can be transferred



# CHR

## Licensing

1

Licence

System ID: 6LR1ZP/utuJ

Level: free

Next Renewal At:

Deadline At:

☐ Limited Upgrades

OK

Generate New ID

Renew Licence

Renew Licence

Account: mymikrotikcomaccount

Password: \*\*\*\*\*

Level: P1

Start

Stop

Close

done

2

Licence

System ID: 6LR1ZP/utuJ

Level: P1

Next Renewal At: Jan/10/2016 21:59:59

Deadline At: Feb/09/2016 21:59:59

☐ Limited Upgrades

OK

Generate New ID

Renew Licence

WinBox → System → License

# CHR

Cloud Hosted Router

- For more info, see the CHR page on our wiki:  
<https://wiki.mikrotik.com/wiki/Manual:CHR>
- Available on the download page:  
<https://mikrotik.com/download#chr>

# Need help?

- Ask a local **distributor**
- Read the manual **wiki.mikrotik.com**
- Email **support@mikrotik.com**
- Hire a **consultant**
- Attend a training class or join an Academy class in a University

# After the MUM

- All presentations - [mum.mikrotik.com](http://mum.mikrotik.com)
- Video - [youtube.com/mikrotik](https://youtube.com/mikrotik)
- License will be added to your account



MikroTik

The image shows the Mikrotik logo in a dark gray, 3D-style font. The word "Mikro" is in a standard sans-serif typeface, while "Tik" is in a bold, italicized sans-serif typeface. Above the letter 'i' in "Mikro", there are three curved lines that suggest motion or signal waves. The entire logo is positioned on a light gray surface that reflects the text below it.