

The Mikrotik logo features a stylized black icon of a sun or moon with three curved lines above the letter 'i' in 'Mikro'. The word 'Mikro' is in a black, italicized, sans-serif font, while 'Tik' is in a bold, black, sans-serif font.

*Mikro***Tik**

MUM Nigeria

November 2017

More than 160 MUM events around the world



*Mikro***Tik**

- Established 1996
- RouterOS created in 1997
- RouterBOARD created in 2002
- First MUM event in Prague 2006
- MUM in Indonesia had 3000 people
- 34 events in 2016



Mikrotik

LATVIA

Karlis Oga

(sales)

Maris Bulans

(support)

Sergejs Boginskis

(support, training)

STAFF

Schedule

10:00

Presentations

12:30

Lunch with tickets

14:00

Presentations

17:00

Raffle, beer

mt.lv/agenda

WiFi

SSID: MUM_Nigeria

Password: mikrotik

MUM Live

www.youtube.com/mikrotik

Special Thanks



New products



1 Gbit
over wireless

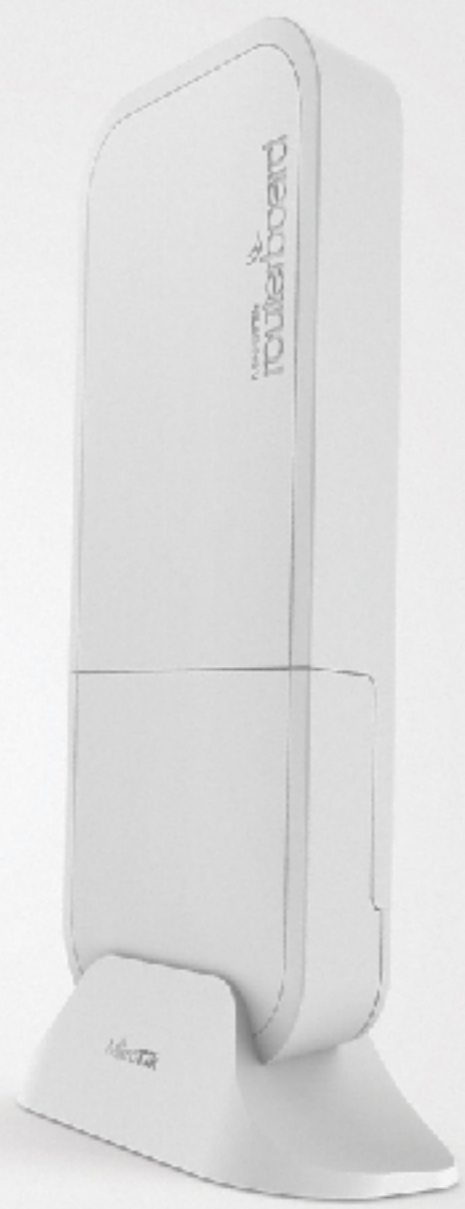
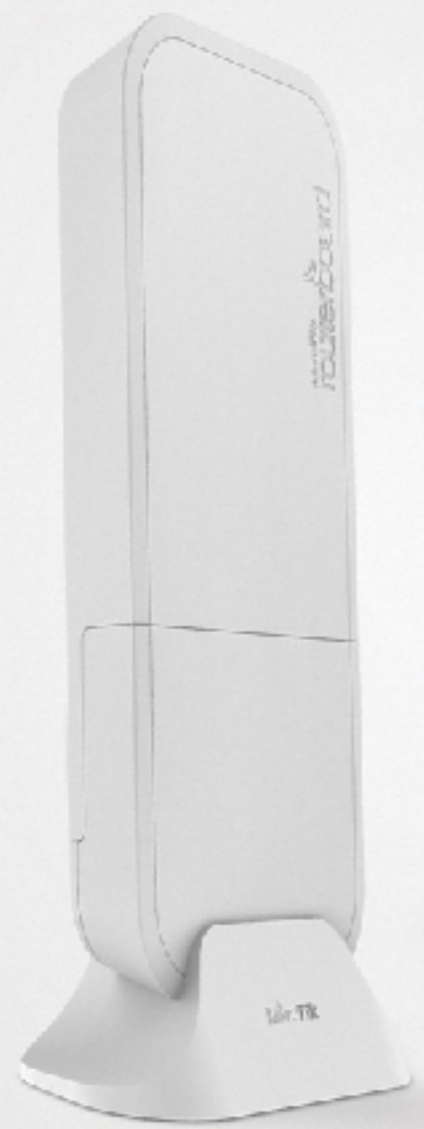
100m+
range

60GHz
radio

Gigabit
Ethernet

Paired
Secure Link
pre-configured

Powered by
IEEE 802.3af Passive
PoE, DC Jack

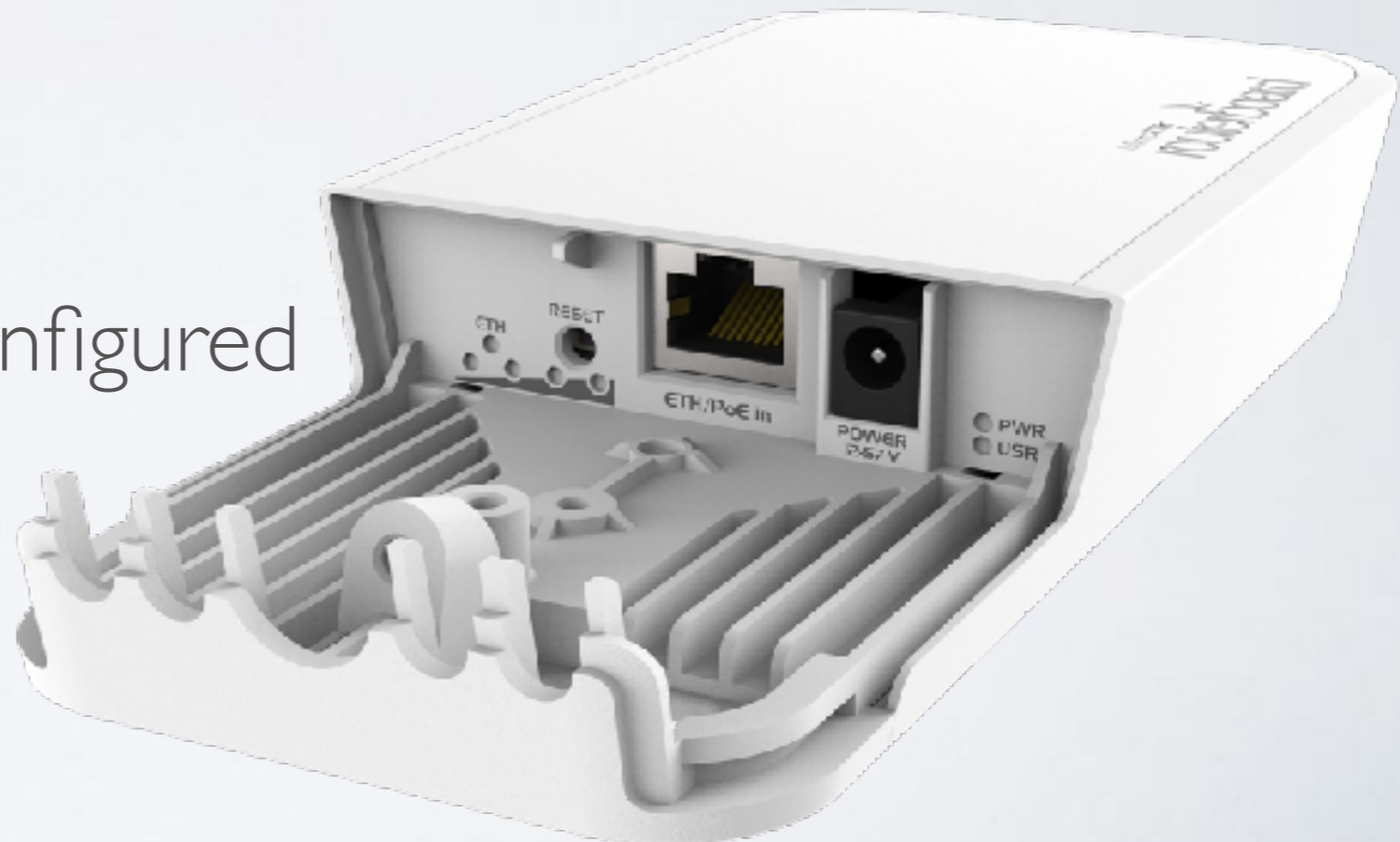


MikroTik

Wireless Wire

Wireless Wire

- 1 Gbps full duplex without wires
- 100 meters +
- 60 GHz beam-forming
- Paired Secure Link Preconfigured
- \$198 kit



LHG 60G

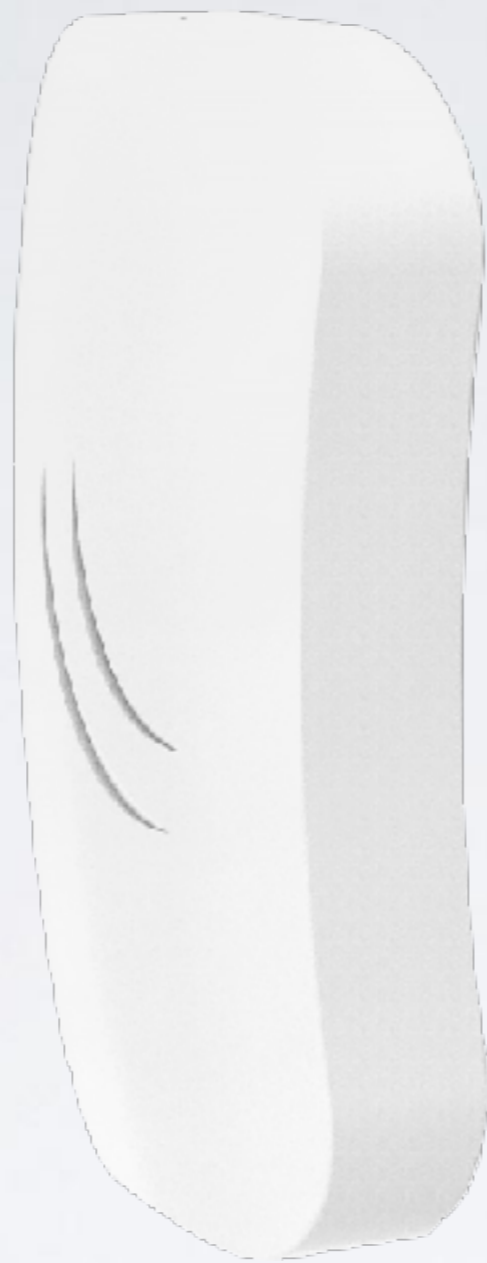
- 1 Gbit full duplex (wire speed)
- Works in 60 GHz spectrum
- Familiar LHG design
- Quad-core ARM CPU
- Low cost and low weight
- Targeted for longer distances than 100 m

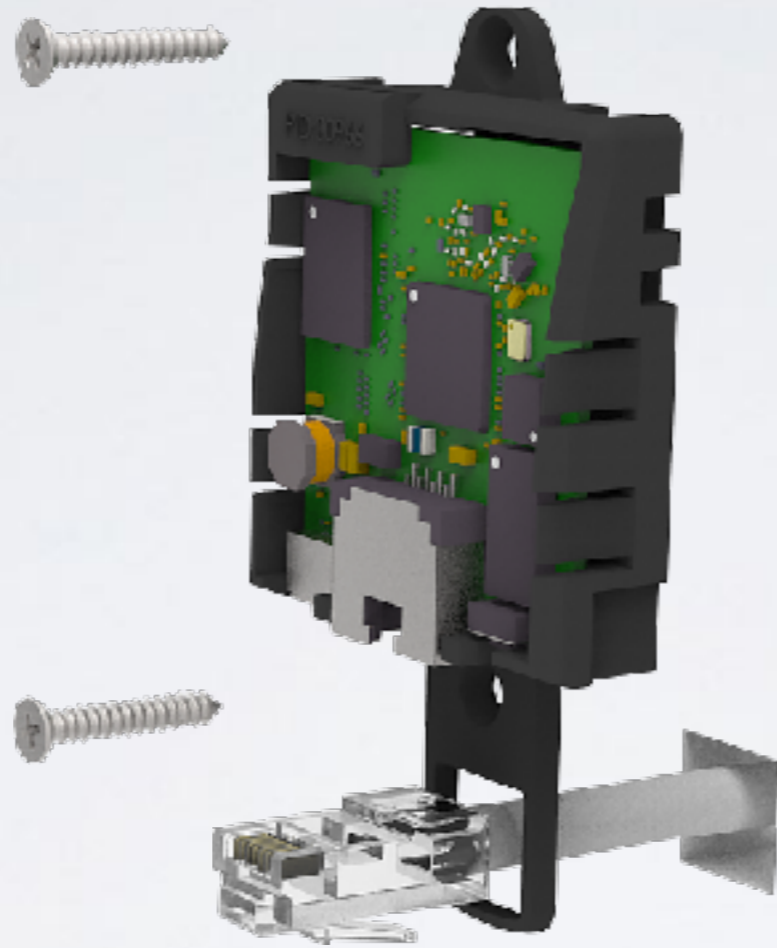


cAP lite

- Small and light 2.4 GHz AP
- Case can be changed
- Print your own case
- Designed for hotels and other public places for Internet access
- \$29 kit







DynaDish 6 and SXT 6

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



\$99



\$179

SXTsq Lite5

- Compact and lightweight
- Two times thinner!
- 16 dBi antenna
- 12 km wireless link
- Low cost and low weight
- Kit price \$46

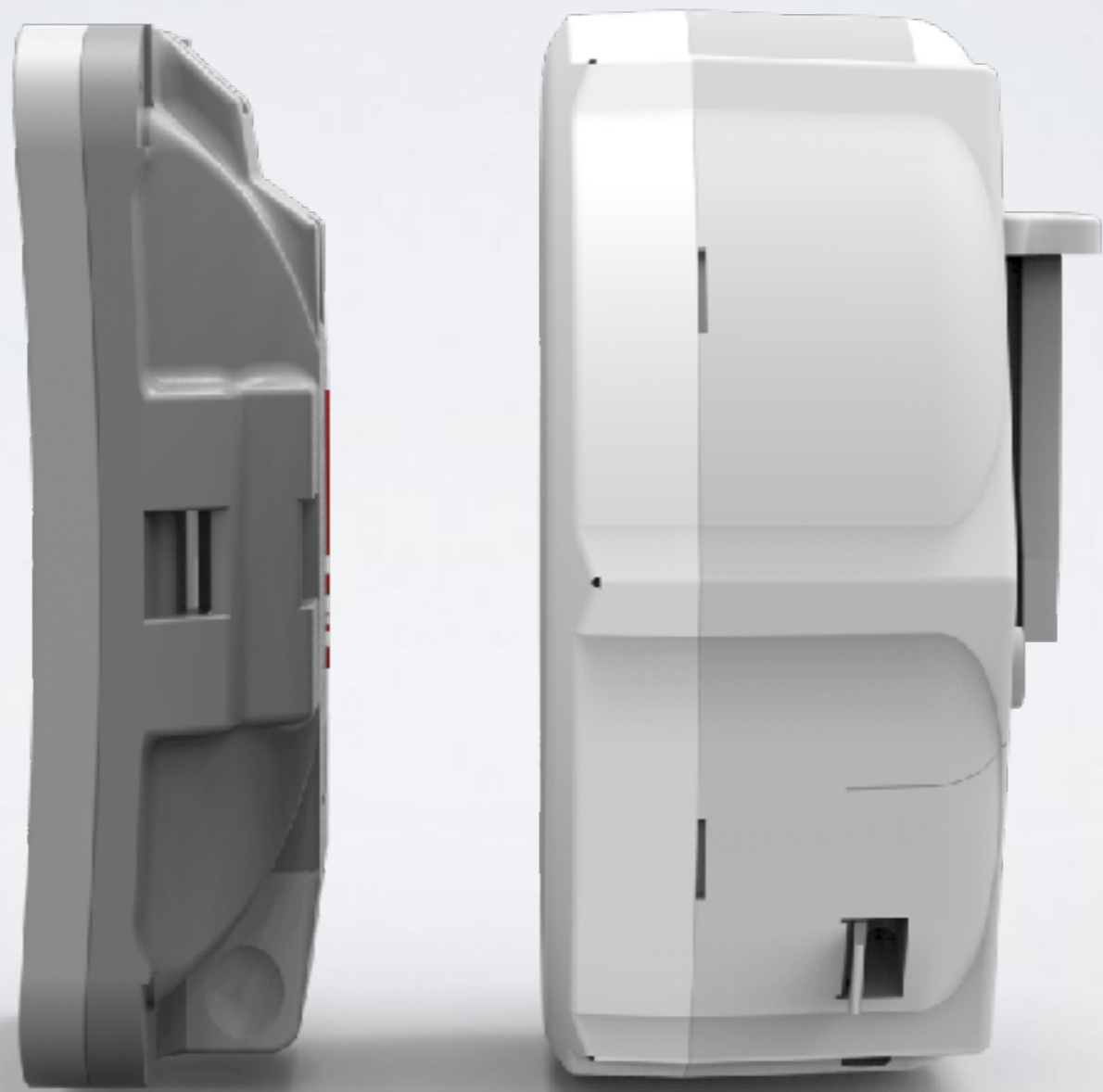


SXTsq 5

- Compact and lightweight
- Two times thinner!
- 16 dBi antenna
- 15 km wireless link
- Low cost and low weight
- Kit price \$49



SXTsq series

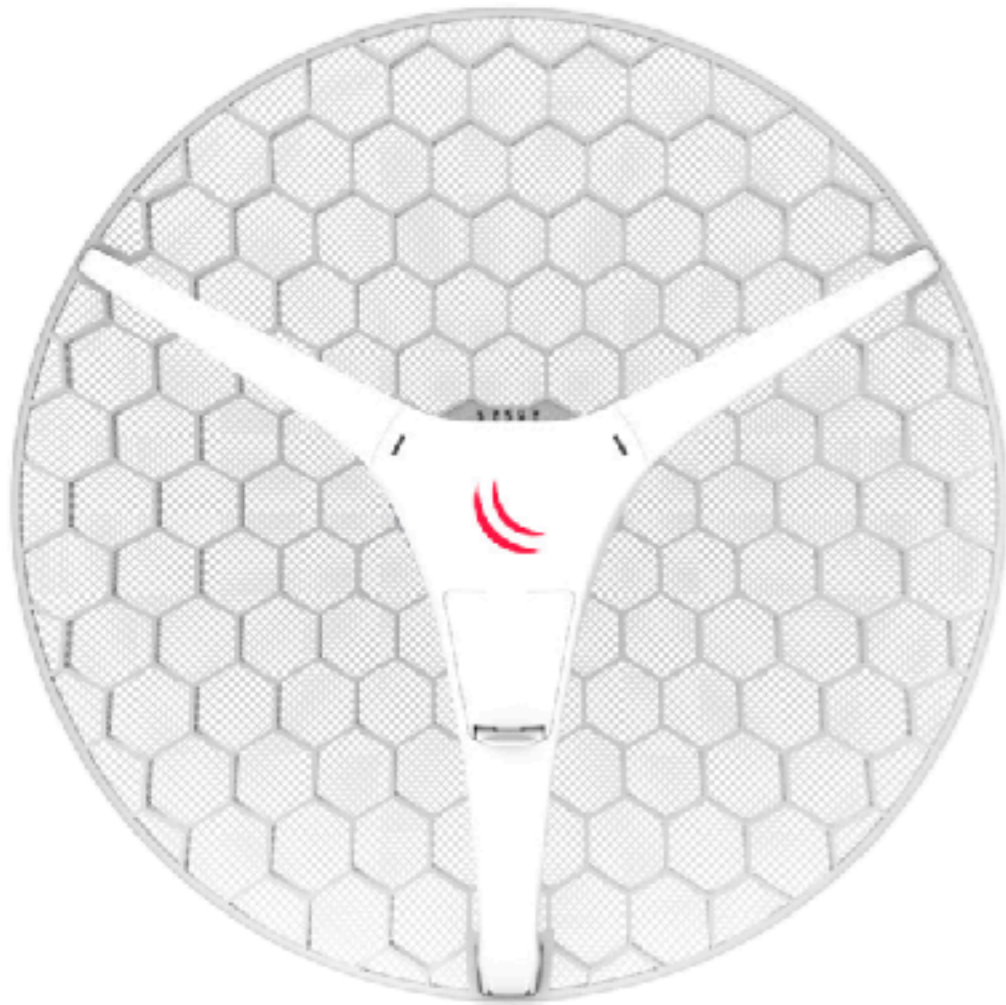


SXTsq 5 ac

- Compact and lightweight
- Ethernet Gigabit
- 16 dBi antenna
- 15 km wireless link
- Low cost and low weight
- Kit price \$55



New LHG!



LHG XL HP5



LHG HP5



LHG 5

LHG HP5

- 630 mW
- 20 km full speed link
- Familiar LHG design
- Low cost and low weight
- Kit price \$69



LHG XL HP5

- 630 mW
- 40 km full speed link
- 27 dBi antenna
- Familiar LHG design
- Low cost and low weight
- Kit price \$79



LHG 2

- 18 dBi grid antenna
- 802.11b/g/n dual chain
- NV2 TDMA
- Familiar LHG design
- Kit price \$58



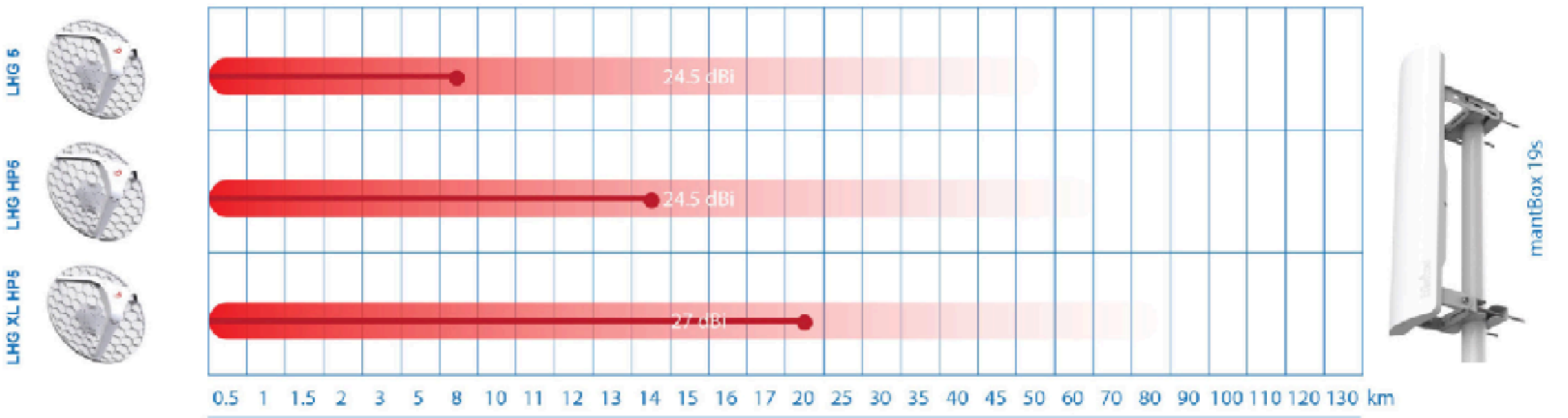
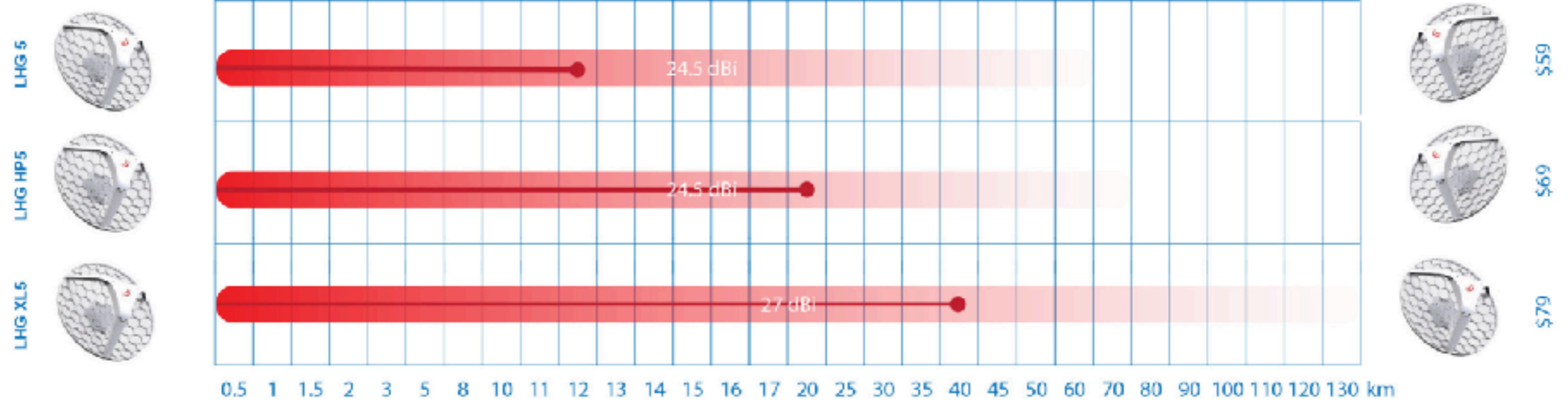
LHG 5 ac

- 24.5 dBi antenna
- Gigabit Ethernet
- Familiar LHG design
- Low cost and low weight
- Kit price \$89



New LHG!

Distance in Km



○ Distance at max supported 802.11a data rate (eg. 865Mbit/s) ● Distance at max supported 802.11n data rate (eg. 300Mbit/s) ■ Max range at -70dBm signal

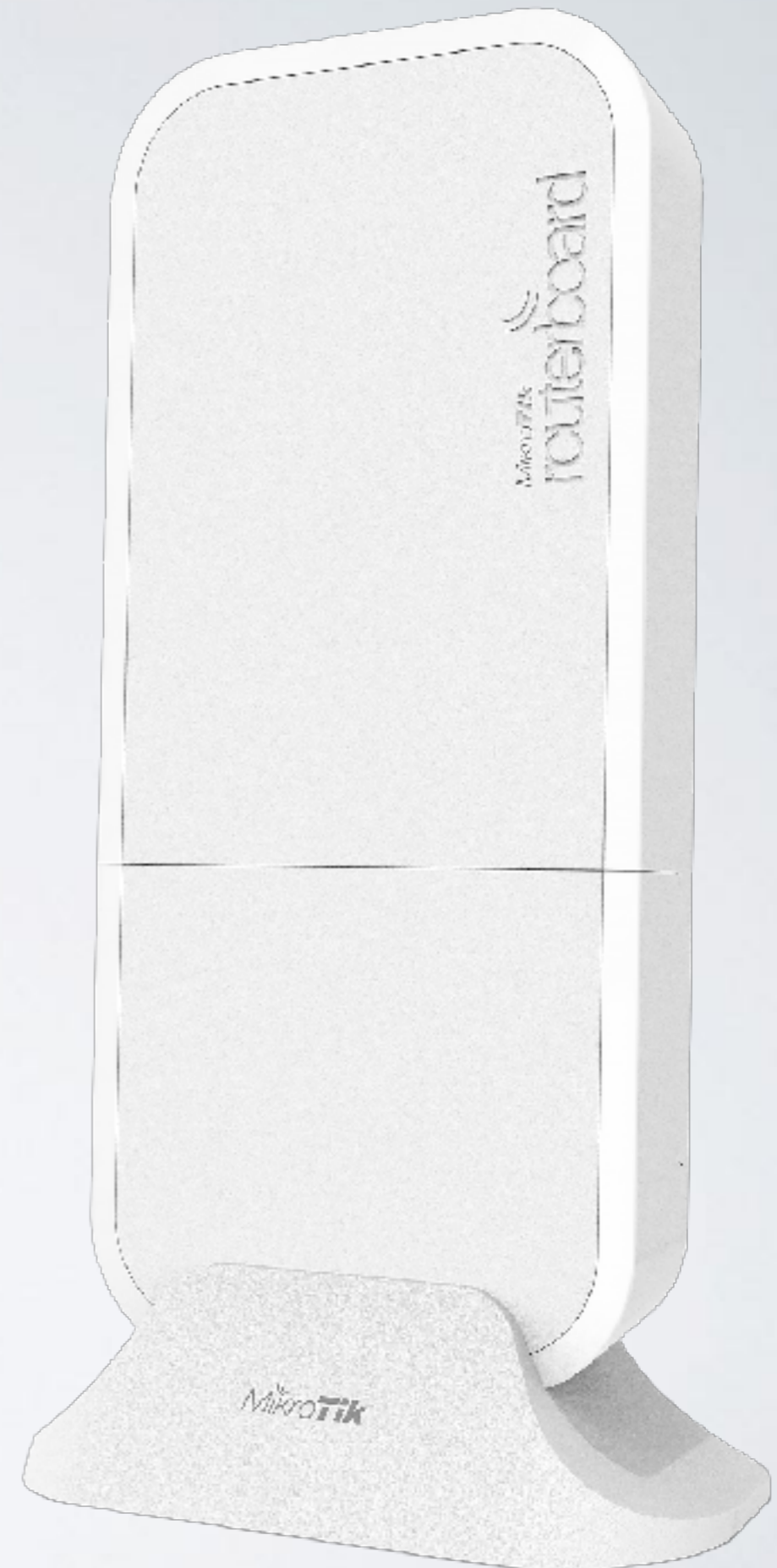
wAP R

- 2.4 GHz AP
- miniPCI-e slot for 3G/4G
- PoE, power jack, automotive connector
- Kit price \$79



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
- Kit price \$119



LtAP mini

- 2.4 GHz AP in a rugged case
- miniPCle for LTE
- Built-in GPS
- Serial port
- Ethernet port
- Perfect for cars or outdoor mobile applications





LtAP

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





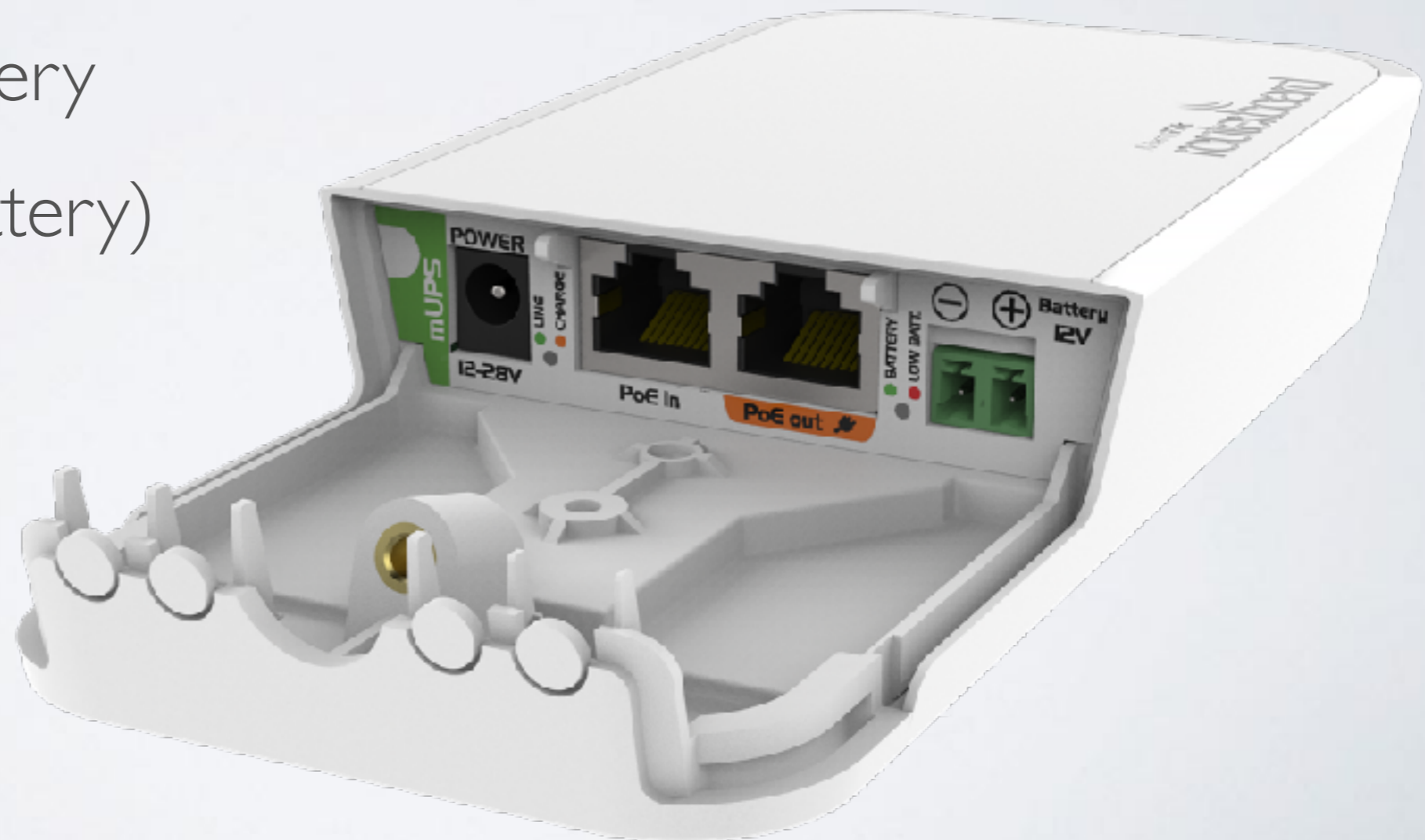
Woobm

- Wireless out of band management
- Connect to your device and get serial access over wireless
- Price \$16



mUPS

- Gigabit PoE injector
- Power supplied by PoE or jack
- RouterBOARD could be powered by battery
- \$29 (without battery)



wsAP ac lite

- Mount into standard EU or US electrical sockets
- Dual band ac (2.4 and 5 GHz)
- Phone jack passthrough
- Two LAN ports
- One of them is PoE out port
- USB port

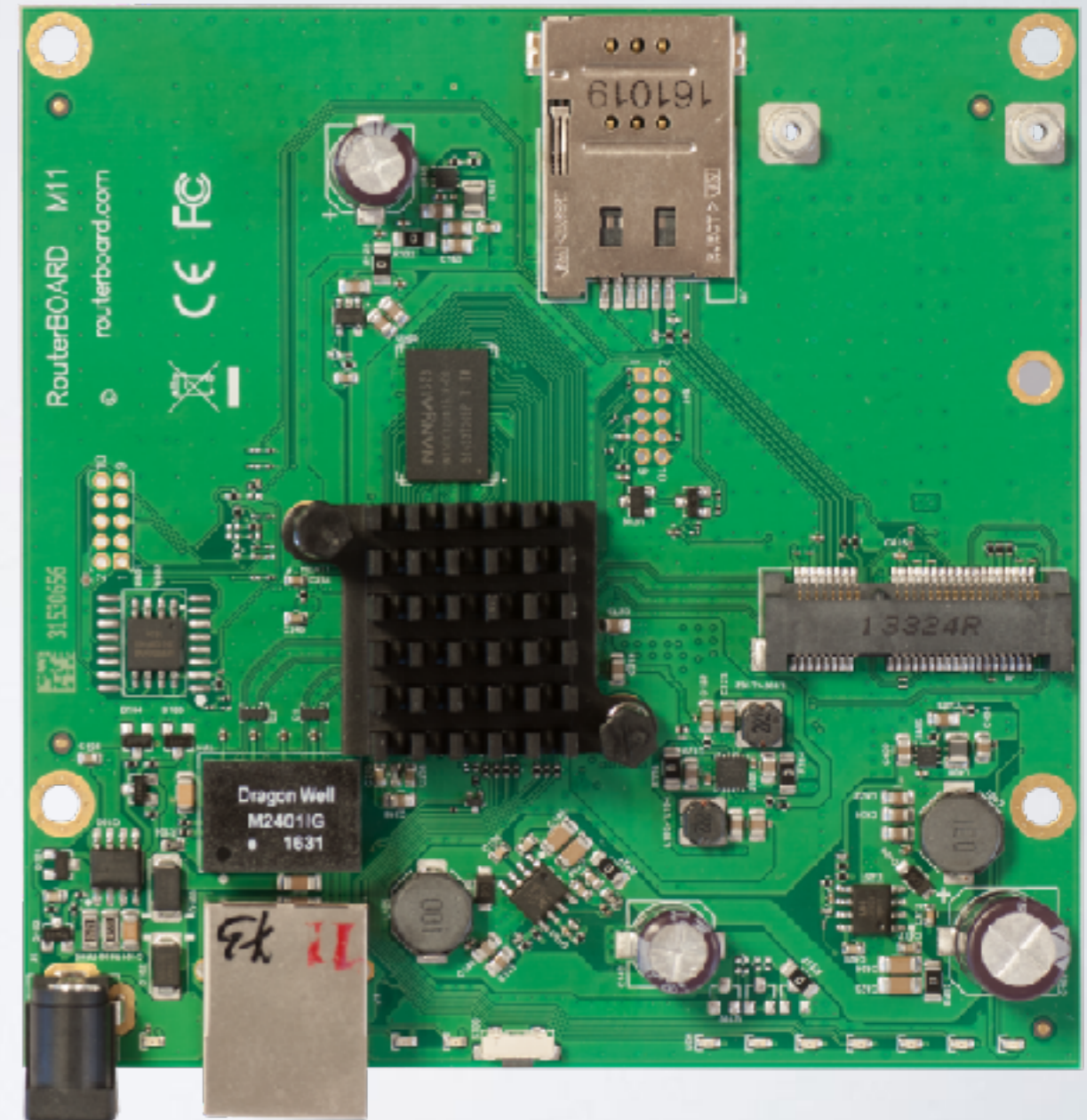






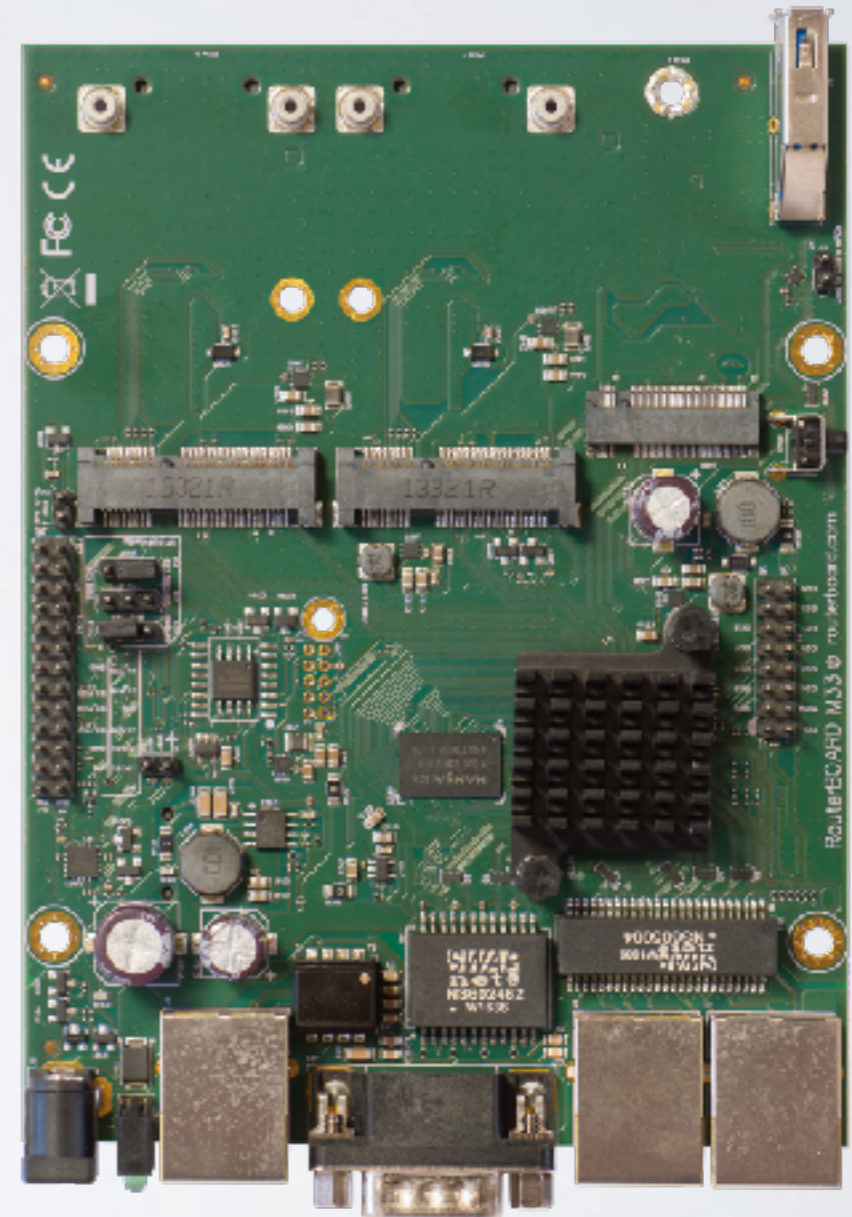
MIIG

- Four core 880 MHz CPU
- 1 miniPCle slot
- 1 Gigabit Ethernet
- Upgrade for RB411
- \$39



M33G

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



S+RJ10

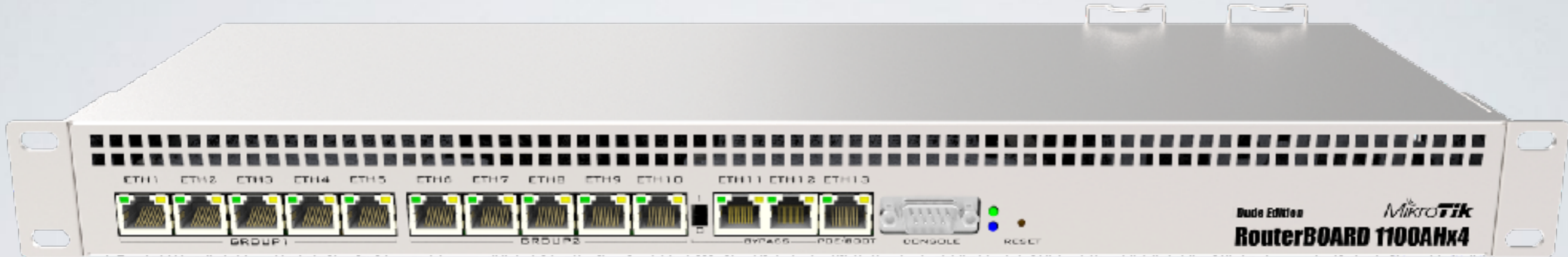
- SFP+ to ethernet
- 6-speeds (10/100/1G/2.5G/5G/10G)
- 2.4 W
- Works with all MikroTik SFP+
- \$65



PW48V

- Hot Swap -48 and +48 V DC telecom power supply
- For CCR1072
- \$100

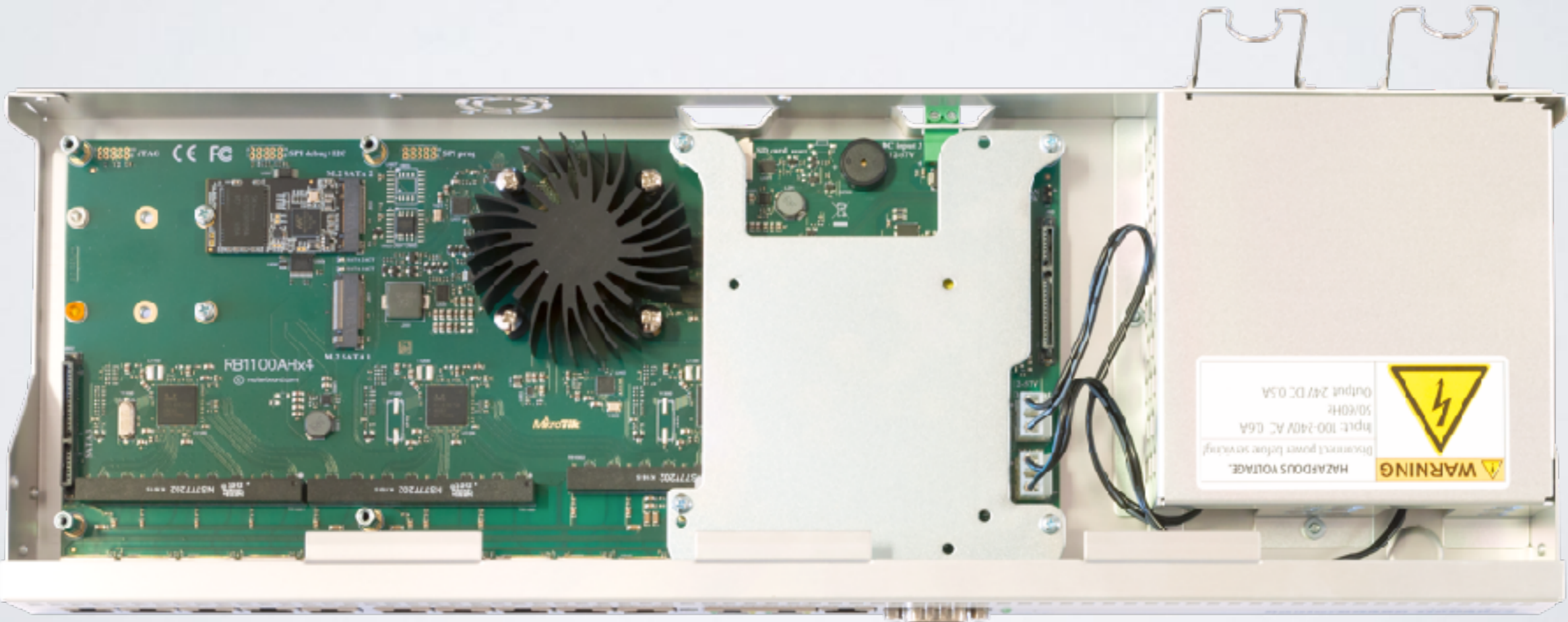




RB 1100AHx4

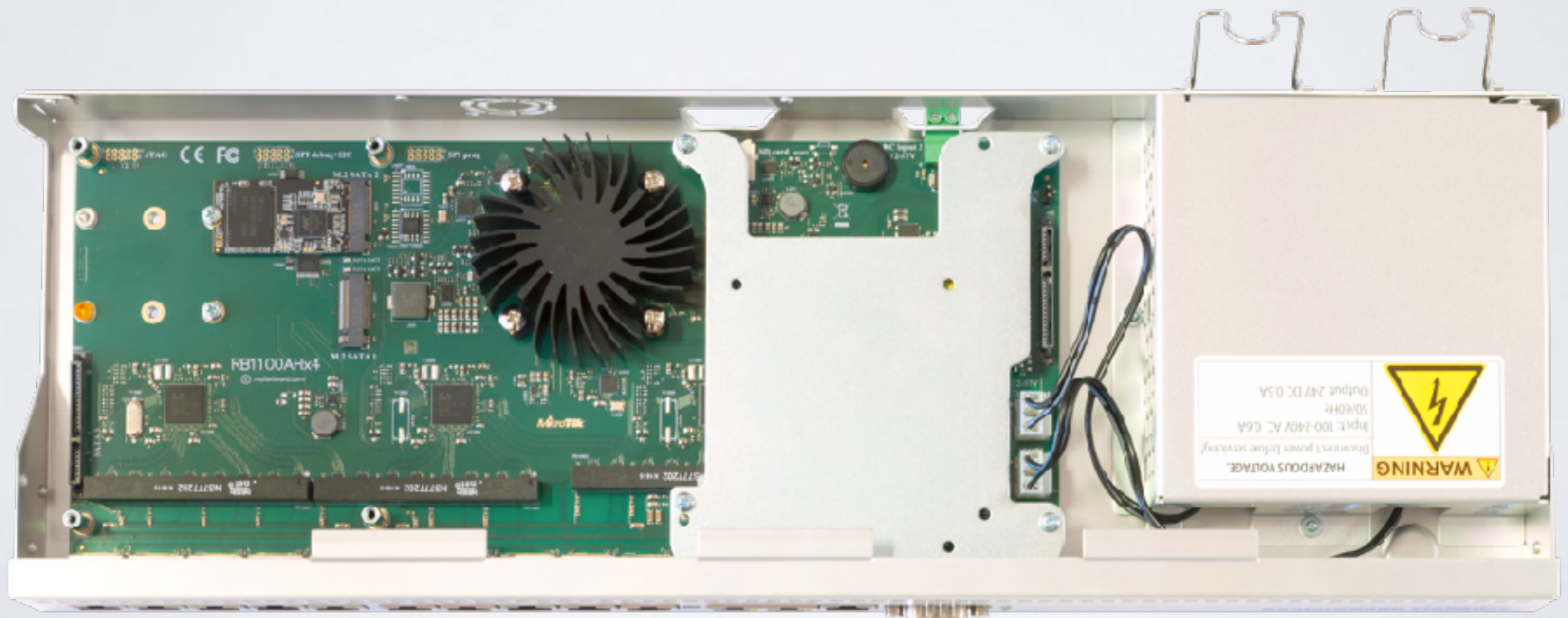
The timeless classic upgraded with a new quad core CPU and more

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



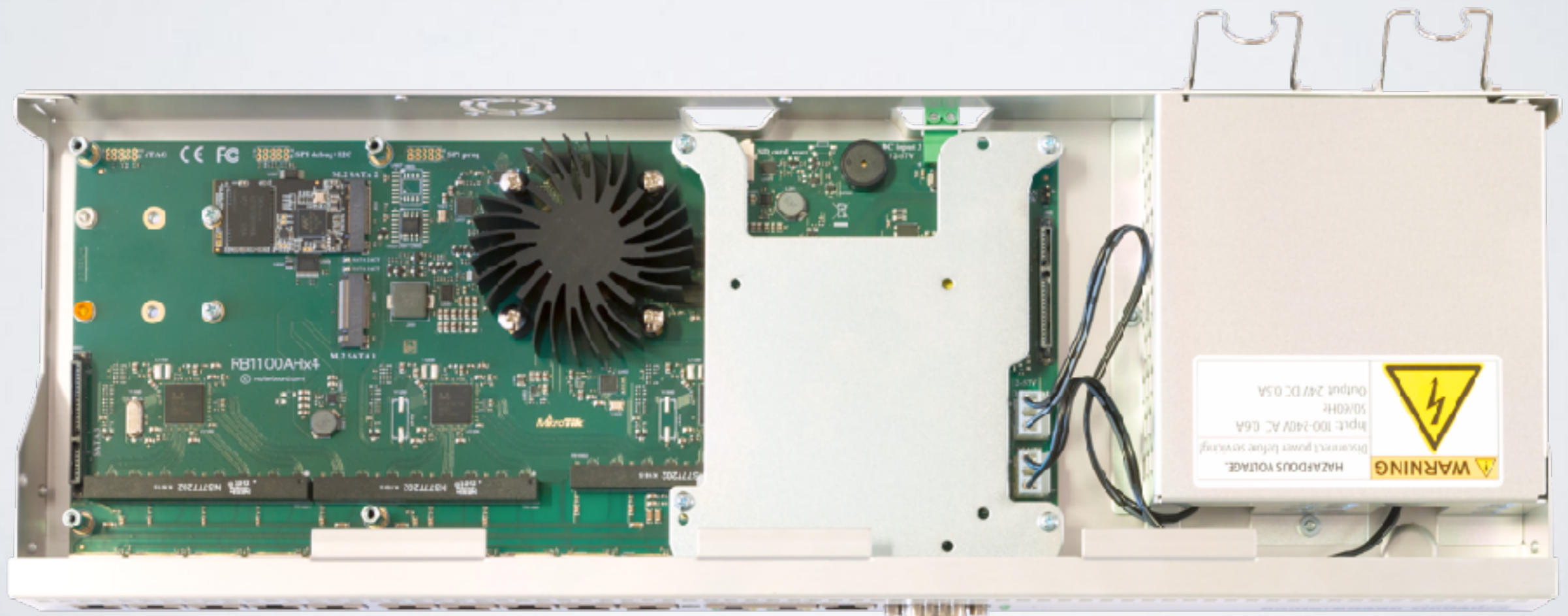
Annapurna Alpine AL21400 CPU with four Cortex A15 cores clocked at 1.4 GHz

- Two SATA3 ports



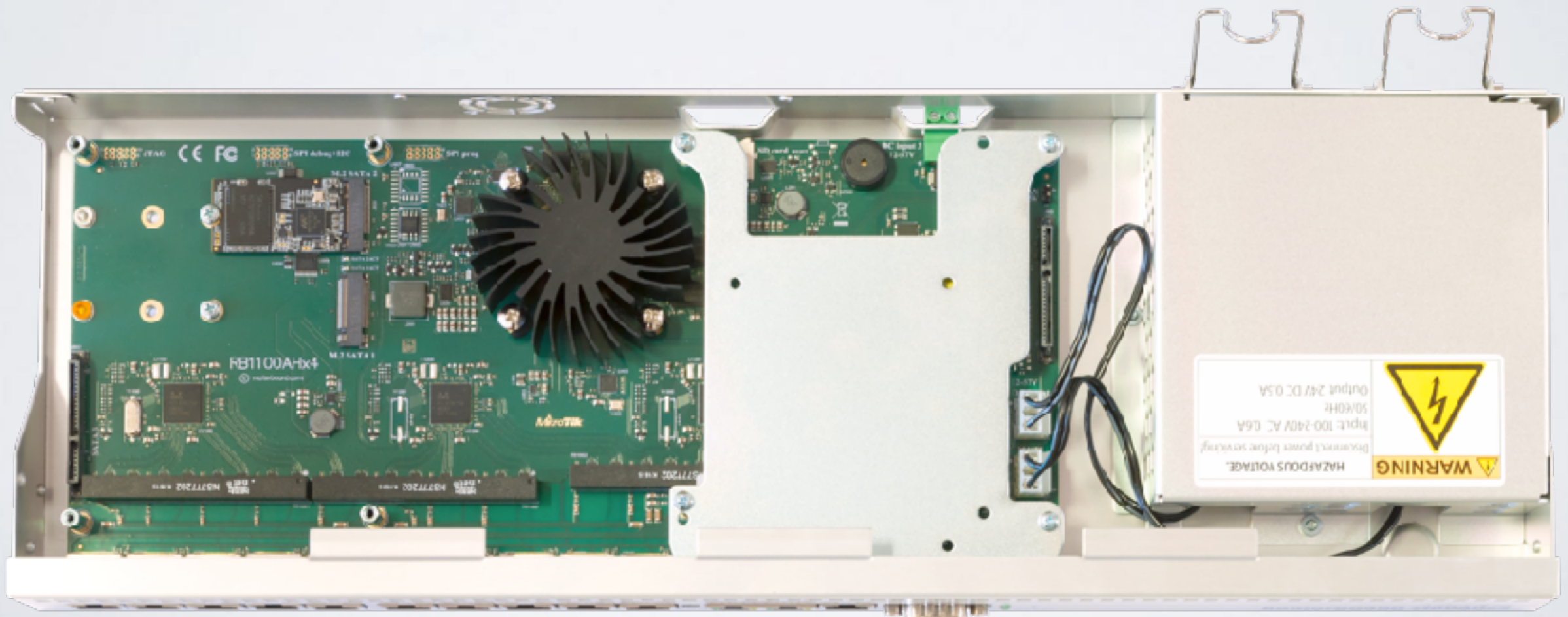
Annapurna Alpine AL21400 CPU with four Cortex A15 cores clocked at 1.4 GHz

- Two SATA3 ports
- Two M.2 ports



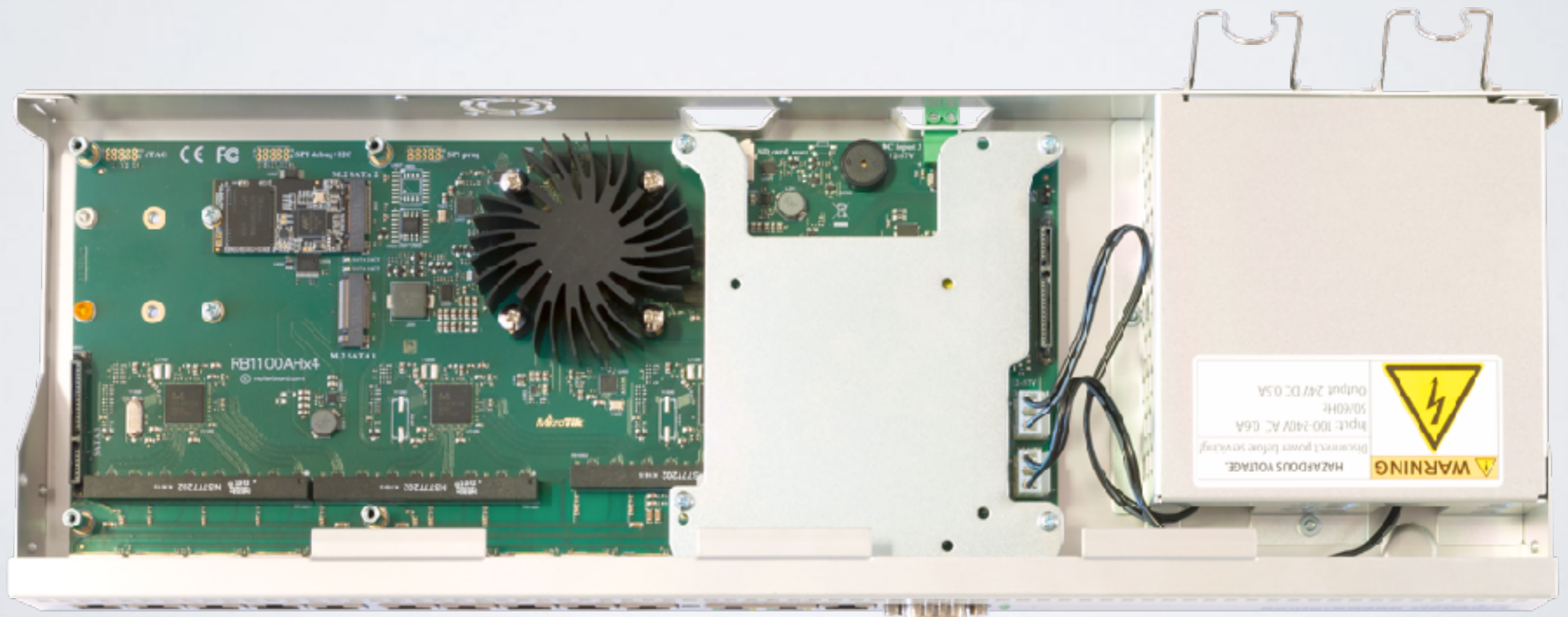
Annapurna Alpine AL21400 CPU with four Cortex A15 cores clocked at 1.4 GHz

- Two SATA3 ports
- Two M.2 ports
- 60 GB SSD included



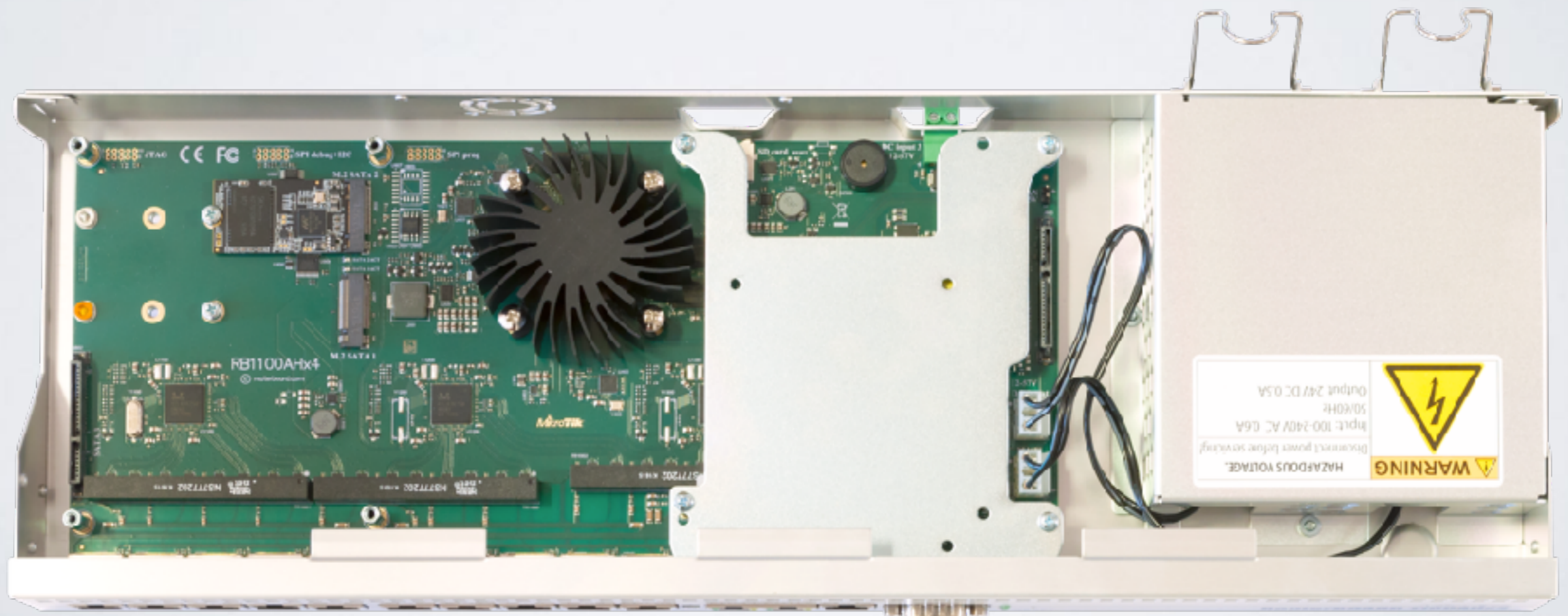
Annapurna Alpine AL21400 CPU with four Cortex A15 cores clocked at 1.4 GHz

- Two SATA3 ports
- Two M.2 ports
- 60 GB SSD included
- Hardware accelerated IPsec



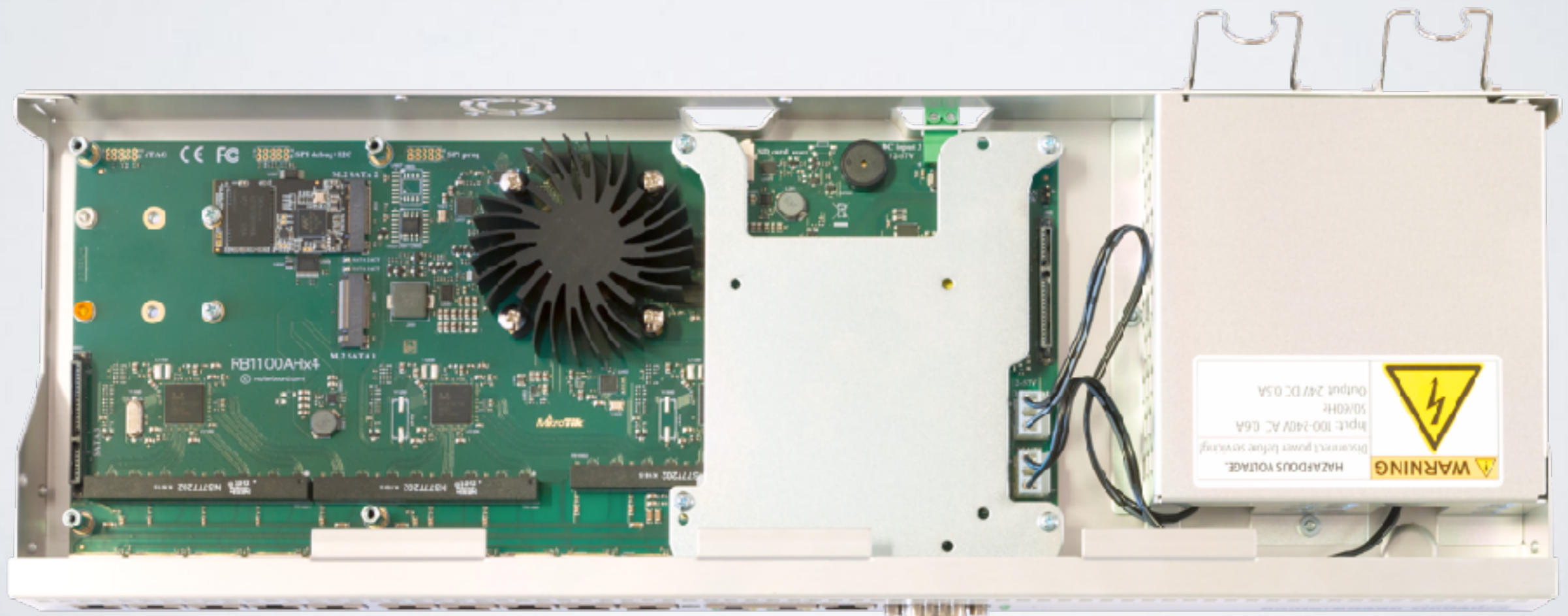
Annapurna Alpine AL21400 CPU with four Cortex A15 cores clocked at 1.4 GHz

- Two SATA3 ports
- Two M.2 ports
- 60 GB SSD included
- Hardware accelerated IPSec
- -48 V DC telecom power



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

- Two SATA3 ports
- Two M.2 ports
- 60 GB SSD included
- Hardware accelerated IPSec
- -48 V DC telecom power
- Dual PSU





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

Two editions

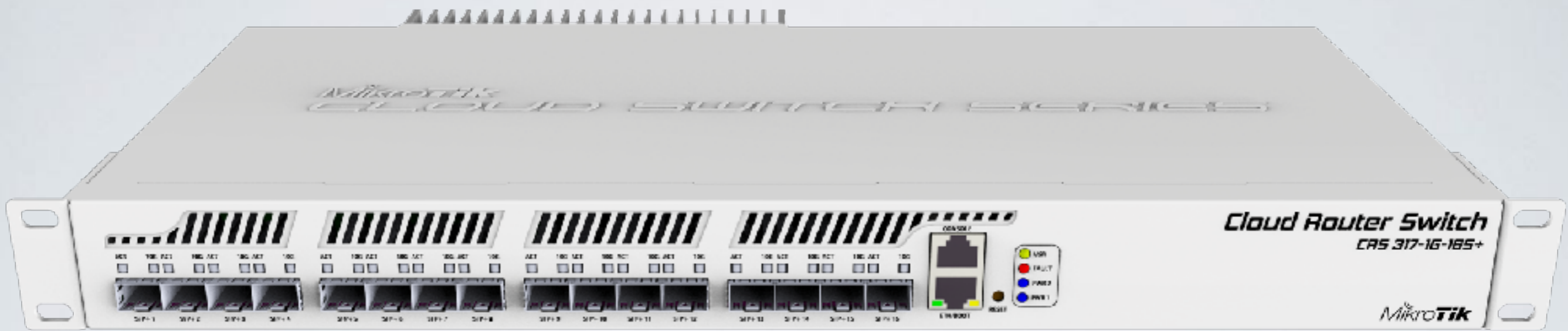
- **RBI I100AHx4 - \$299**
- **RBI I100AHx4 Dude edition**
2x M.2, 2x SATA3 and 60 GB SSD disk - **\$349**

FiberBox

- Weatherproof case
- 5 SFP ports
- RJ45 SFP (S-RJ01) included
- \$79



now



CRS317-1G-16S+

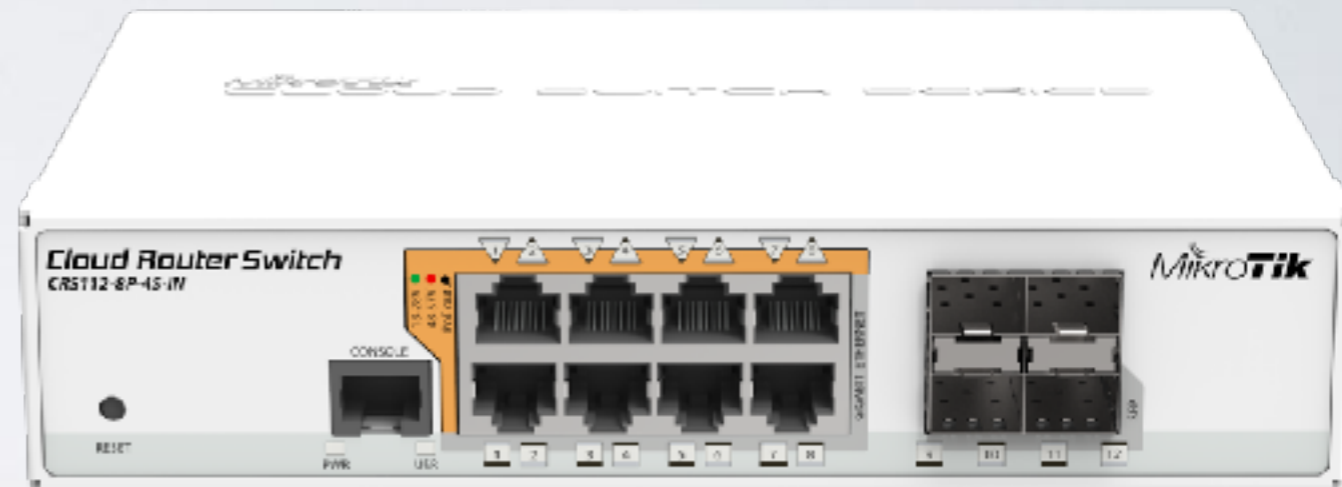
High performance SFP+ switch

CRS317-1G-16S+

- 16 SFP+ ports
- Next generation switching chip
- Hardware-based Spanning Tree Protocol
- Dual boot - SwOS or RouterOS
- \$399

CRS112-8P-4S

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



CRS328-24P-4S+RM

Smart PoE out switch



CRS328-24P-4S+RM

Smart PoE out switch

CRS328-24P-4S+RM

- Dual boot - SwOS or RouterOS
- 24 port with PoE out function
- Supports 802.3af/at and passive output
- Per port auto detection of PoE standard
- Four SFP+ ports for 10 GbE
- One 100-240 V IEC connector

All products

- Included free software upgrades for life
- Run the same RouterOS or SwOS software
- For more information see:
<https://mikrotik.com/products>

NEWS IN ROUTEROS

CHR

Cloud Hosted Router

- RouterOS version tailored for running in virtual environments
- Runs on VMware, Workstation, VirtualBox, ESXi, HyperV, KVM, XenServer, etc.
- Cloud services - Amazon, Azure and others
- CHR available as OVA (Open Virtual Appliance)

CHR

Use cases

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

CHR

Licensing

License	Speed limit per	Price
Free	1 Mbit	FREE
PI	1 Gbit	US\$45
PI0	10 Gbit	US\$95
P-Unlimited	Unlimited	US\$250

- 60 day trial available
- Purchased license can be transferred

CHR

Licensing

1

Licence

System ID: 6R1ZP/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: 6R1ZP/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

Licensing

3

The screenshot shows the MikroTik client account page. The navigation bar includes links for Home, Buy, About, Jobs, Hardware, Software, Support, Training, and Account (highlighted with a red circle). The main content area is titled "My account" and includes a "Log out MikroTik" link. The left sidebar contains a "Toggle menu" and several sections: ACCOUNT INFORMATION (Home, Balance, Edit account details, MUM registration history, Hardware orders), WEB ORDERS (Your orders and invoices, Purchase a RouterOS license key), ROUTEROS KEYS (Search and view all keys, Request key from another account, Transfer prepaid keys (21), Make a demo key, Make a key from prepaid key (21)), and CHR LICENCES (All CHR keys, CHR orders and invoices, Transfer CHR prepaid keys). The CHR LICENCES section is highlighted with a red circle. A red arrow points from the "Account" link in the navigation bar to the "CHR LICENCES" section in the sidebar. The main content area displays a "Welcome, MikroTik!" message, "Account notices" (Prepaid keys: You have 5 prepaid license keys available), and "Visit upcoming MUM events!" with a list of events: Indonesia in Yogyakarta (Oct 27 - 28), Brazil in Maceio, Alagoas (Nov 9 - 10), Uruguay in Montevideo (Nov 13), and South Africa in Cape Town (Nov 24).

mikrotik.com/client

CHR

Licensing

4

User keys

Show entries

10

Search

System ID	Issued	Expires	Level	Transfer	Action	Status	Note
vmxAucZ7VtK	2016-05-31	---	P1-Perpetual	Transfer	Upgrade		
OMaZwuXjj4N	2016-04-04	---	P10-Perpetual	Transfer	Upgrade		
Cm8ATgygn2H	2017-09-13	---	P-Unlimited	Transfer			
+OfzKswA4TC	2017-08-24	---	P10-Perpetual	Transfer	Upgrade		
4Mc+U51oLoN	2016-06-10	---	P1-Perpetual	Transfer	Upgrade		
10971UBIKZK	2015-12-28	---	P1-Perpetual	Transfer	Upgrade		
JPyotBTRsJK	2015-12-09	---	P10-Perpetual	Transfer	Upgrade		

mikrotik.com/client/cloudhosting

CHR

Licensing

5


Upgrade system license

System ID

AuykNnBPF/E

Level

P1-Perpetual (\$ 45.00)

 Upgrade key

1Gbit per interface (\$45 one time payment)

You have following prepaid balance keys available to purchase a CHR license:

- P1-Perpetual - 5 keys

mikrotik.com/client/cloudhosting

CHR

Licensing

6

Payment i

You have selected	System ID
P1-Perpetual	AuykNnBPF/E
Total price: \$54.45	

Pay using deposit (left: \$100)

Pay using CC

Pay using PayPal

Pay using Balance key (5)

Note: Price includes VAT 21% because you have specified EU country as your residence. To avoid this you have to enter your VAT registration number in your account settings.

mikrotik.com/client/cloudhosting

RouterOS changelog

- 6.40 - 161 entries
- 6.40.1 - 14 entries
- 6.40.2 - 10 entries
- 6.40.3 - 28 entries
- 6.40.4 - 33 entries
- 246 entries in total!

LTE passthrough

- Bridge over LTE to the connected device
- IPv4/IPv6 to the connected device
- On LTE device **only modem configuration**
- For one device only
- Specific modems are supported

Bridge functions

- Hardware based MSTP support for CRS3xx devices
- Software based MSTP support for other RouterOS powered devices
- Hardware IGMP snooping for CRS
- Software IGMP snooping for other RouterOS powered devices

TR069 client

- RouterOS data model based TR-181 issue 2 amendment 11
- Works with AVSystem, Axiros, FriendlyTech and GenieACS servers
- Installed as a separate package
- Recommended to use with HTTPS

IPsec results

IPsec test results

RB750Gr3		RB750Gr3 IPsec throughput					
Mode	Configuration	1400 byte		512 byte		64 byte	
		kpps	Mbps	kpps	Mbps	kpps	Mbps
Single tunnel	AES-128-CBC + SHA1	42.6	477.1	56.9	233.1	55.2	28.3
256 tunnels	AES-128-CBC + SHA1	42.9	480.5	49.5	202.8	51.3	26.3
256 tunnels	AES-128-CBC + SHA256	42.9	480.5	49.5	202.8	51.3	26.3
256 tunnels	AES-256-CBC + SHA1	32.0	358.4	49.1	201.1	49.2	25.2
256 tunnels	AES-256-CBC + SHA256	32.0	358.4	49.1	201.1	49.2	25.2

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, 1400 byte packet sizes
3. Test results show device maximum performance, and are reached using mentioned hardware and software configuration, different configurations most likely will result in lower results

Wireless link calculator

The screenshot displays a web-based wireless link calculator interface. The browser address bar shows 'mikrotik.com'. The interface is divided into several sections:

- Specifications and results:** A sidebar on the left containing input fields and a dropdown menu for device selection.
- Frequency:** Set to 5 GHz.
- Desired data rate:** 1300 Mbps.
- Tx device:** DISC Lite5.
- Rx device:** A dropdown menu is open, listing various antenna models such as BaseBox 2, BaseBox 5, DISC Lite5, DynaDish 5, DynaDish 6, Groove 52, Groove 52 ac, GrooveA 52, GrooveA 52 ac, LDF 5, LHG 6, LHG HP5, LHG XL HP5, Metal 2, Metal 6, Metal 52 ac, Metal 9, NetBox 5, NetMetal 5, NetMetal 5, NetMetal 5, NetMetal 5, OmniTIK 5, OmniTIK 5 PoE, OmniTIK 5 PoE ac, OmniTIK 5 ac, QRT 2, and QRT 5.
- Tx Gain (dBi):** 21.
- RX Sensitivity (dBm):** Empty field.
- Output Power (dBm):** Empty field.
- Distance:** 16.0 Km (9.94 miles).
- Free Space Path Loss:** Empty field.
- Theoretical signal level at TX:** Empty field.
- Theoretical signal level at RX:** Empty field.
- Link status:** Empty field.
- Reset:** A red button with a circular arrow icon.

The main area features a map of Latvia with a red line connecting a Tx (Transmitter) location near Rīga to an Rx (Receiver) location near Ādaži. A topographic profile graph is overlaid on the map, showing elevation in meters (m) on the y-axis (0 to 20) and distance in kilometers (km) on the x-axis (0 to 16). The graph shows several peaks, with the highest reaching approximately 20 meters. Other locations labeled on the map include Sigulda, Vangaži, Ropāži, Jugla, Ķekava, Ogre, Olaine, and Daugavgrīvas sala.

Detect Internet

- Automatic interface functionality detection

```
[[sergejs@3B12_SergejsGW_CCR1036] > interface detect-internet state print
```

#	NAME	STATE
0	sfp1	no-link
1	ether1	no-link
2	ether2	no-link
3	ether3	no-link
4	ether4	no-link
5	ether5	lan
6	ether6	lan
7	ether7	lan
8	ether8	internet
9	bridge1	lan

```
[[sergejs@3B12_SergejsGW_CCR1036] > █
```

Need help?

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

After the MUM

- All presentations - mum.mikrotik.com
- Videos - youtube.com/mikrotik
- License for paid and voucher registrations will be sent by an e-mail

The logo for Microtik features the word "Microtik" in a stylized, italicized font. The "Micro" portion is in a lighter weight, while "tik" is in a bold, italicized weight. Above the letter "i" in "Micro" are three curved lines that resemble a stylized sun or a signal. The entire logo is rendered in a dark gray color and is reflected on a light gray surface below it.

*Micro**tik***