

New Obvious and Obscure MikroTik RouterOS v6 features

New Orleans,
MUM USA 2012

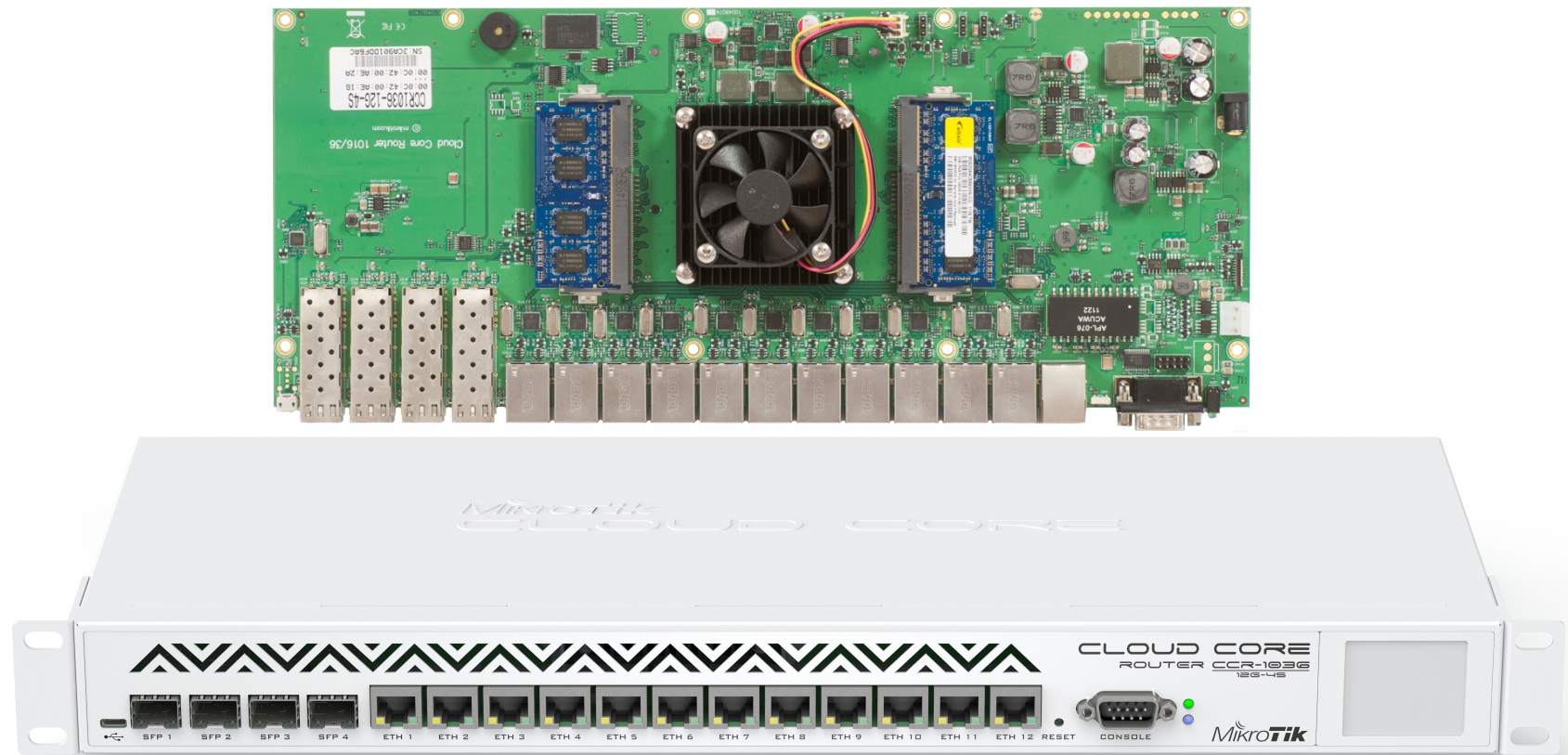
Good News Everyone!!!

RouterOS v6.0 full release
is almost here!!!

(there is still chance to delay it by reporting nice errors – it is all in your hands)

Support for New Products

- Full support of announced and unannounced CloudCore devices will be added only for RouterOS v6.x (and above)

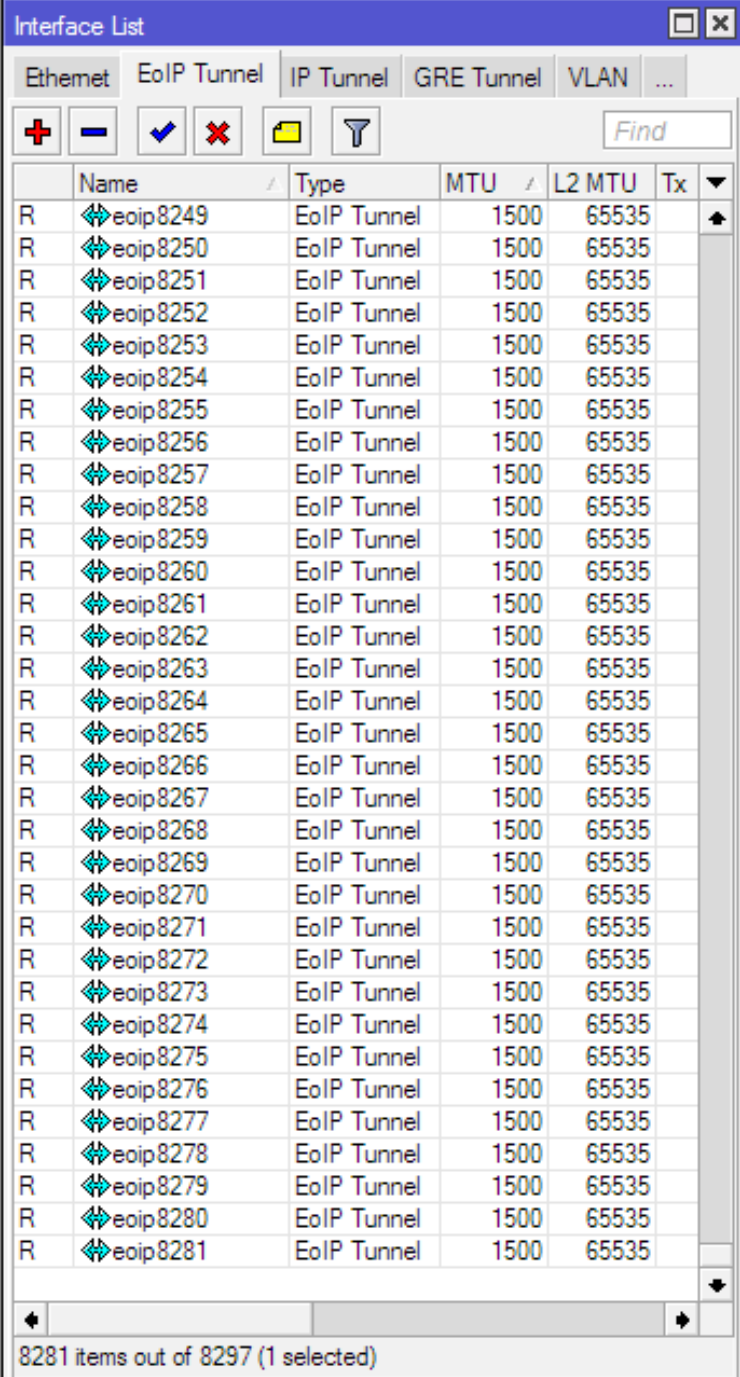


New Linux Kernel

- RouterOS 5.21
 - Linux Kernel version 2.6.35
- RouterOS 6.x
 - Linux Kernel version 3.3.5+
- For more detailed information see:
<http://www.kernel.org/>

New Kernel Features

- Newest interface driver support for x86 systems
- Improved interface management - scales well for up to thousands of interfaces and more
- Uses less space on storage - works well with 32MiB flash



	Name	Type	MTU	L2 MTU	Tx
R	↔e0ip8249	EoIP Tunnel	1500	65535	
R	↔e0ip8250	EoIP Tunnel	1500	65535	
R	↔e0ip8251	EoIP Tunnel	1500	65535	
R	↔e0ip8252	EoIP Tunnel	1500	65535	
R	↔e0ip8253	EoIP Tunnel	1500	65535	
R	↔e0ip8254	EoIP Tunnel	1500	65535	
R	↔e0ip8255	EoIP Tunnel	1500	65535	
R	↔e0ip8256	EoIP Tunnel	1500	65535	
R	↔e0ip8257	EoIP Tunnel	1500	65535	
R	↔e0ip8258	EoIP Tunnel	1500	65535	
R	↔e0ip8259	EoIP Tunnel	1500	65535	
R	↔e0ip8260	EoIP Tunnel	1500	65535	
R	↔e0ip8261	EoIP Tunnel	1500	65535	
R	↔e0ip8262	EoIP Tunnel	1500	65535	
R	↔e0ip8263	EoIP Tunnel	1500	65535	
R	↔e0ip8264	EoIP Tunnel	1500	65535	
R	↔e0ip8265	EoIP Tunnel	1500	65535	
R	↔e0ip8266	EoIP Tunnel	1500	65535	
R	↔e0ip8267	EoIP Tunnel	1500	65535	
R	↔e0ip8268	EoIP Tunnel	1500	65535	
R	↔e0ip8269	EoIP Tunnel	1500	65535	
R	↔e0ip8270	EoIP Tunnel	1500	65535	
R	↔e0ip8271	EoIP Tunnel	1500	65535	
R	↔e0ip8272	EoIP Tunnel	1500	65535	
R	↔e0ip8273	EoIP Tunnel	1500	65535	
R	↔e0ip8274	EoIP Tunnel	1500	65535	
R	↔e0ip8275	EoIP Tunnel	1500	65535	
R	↔e0ip8276	EoIP Tunnel	1500	65535	
R	↔e0ip8277	EoIP Tunnel	1500	65535	
R	↔e0ip8278	EoIP Tunnel	1500	65535	
R	↔e0ip8279	EoIP Tunnel	1500	65535	
R	↔e0ip8280	EoIP Tunnel	1500	65535	
R	↔e0ip8281	EoIP Tunnel	1500	65535	

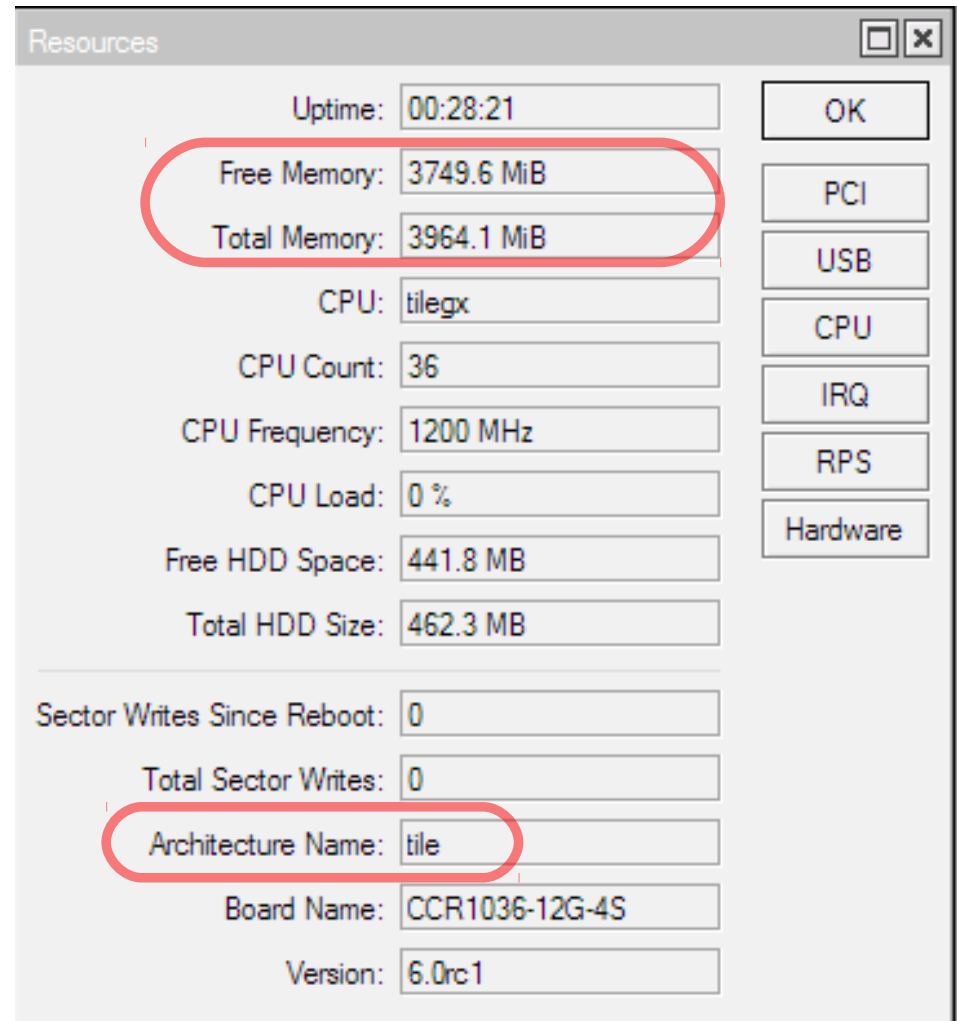
8281 items out of 8297 (1 selected)

New CPU architecture support

- In v5.x there were 4 different architectures
 - Mipsle (RB1xx, RB5xx)
 - Mipsbe (RB4xx, RB7xx, RB9xx, RB2011)
 - ppc (RB1xxx, RB6xx, RB8xx)
 - X86
- In v6.x there will be one more
 - Tile (CCR1xxx)

RouterOS Tile architecture

- Only for CCR devices
- 64-bit operating system (more RAM)
- Dual memory channel support (faster RAM)
- Hardware Accelerated Multi-threading (no need for RPS and IRQ managment)



The screenshot shows the 'Resources' window in RouterOS. It displays various system metrics and hardware information. Two red circles highlight specific fields: 'Free Memory: 3749.6 MiB' and 'Total Memory: 3964.1 MiB' in the top section, and 'Architecture Name: tile' in the bottom section.

Field	Value
Uptime	00:28:21
Free Memory	3749.6 MiB
Total Memory	3964.1 MiB
CPU	tilegx
CPU Count	36
CPU Frequency	1200 MHz
CPU Load	0 %
Free HDD Space	441.8 MB
Total HDD Size	462.3 MB
Sector Writes Since Reboot	0
Total Sector Writes	0
Architecture Name	tile
Board Name	CCR1036-12G-4S
Version	6.0rc1

Buttons on the right: OK, PCI, USB, CPU, IRQ, RPS, Hardware.

CPU				
Find				
CPU	Load (%)	IRQ (%)	Disk (%)	
cpu0	0	0	0	
cpu1	0	0	0	
cpu2	0	0	0	
cpu3	0	0	0	
cpu4	0	0	0	
cpu5	0	0	0	
cpu6	0	0	0	
cpu7	0	0	0	
cpu8	0	0	0	
cpu9	0	0	0	
cpu10	0	0	0	
cpu11	0	0	0	
cpu12	0	0	0	
cpu13	0	0	0	
cpu14	0	0	0	
cpu15	0	0	0	
cpu16	0	0	0	
cpu17	0	0	0	
cpu18	0	0	0	
cpu19	0	0	0	
cpu20	0	0	0	
cpu21	0	0	0	
cpu22	0	0	0	
cpu23	0	0	0	
cpu24	0	0	0	
cpu25	0	0	0	
cpu26	0	0	0	
cpu27	0	0	0	
cpu28	0	0	0	
cpu29	0	0	0	
cpu30	0	0	0	
cpu31	0	0	0	
cpu32	0	0	0	
cpu33	0	0	0	
cpu34	0	0	0	
cpu35	0	0	0	

36 items

What else is new?

- Lifted 16 CPU core limit
- Improved RouterOS performance on multi-cpu systems (up to 20%)
- Improved RouterBOARD interface driver performance (up to 30%)
- Routerboard package is now merged into system package

Throughput in millions pps

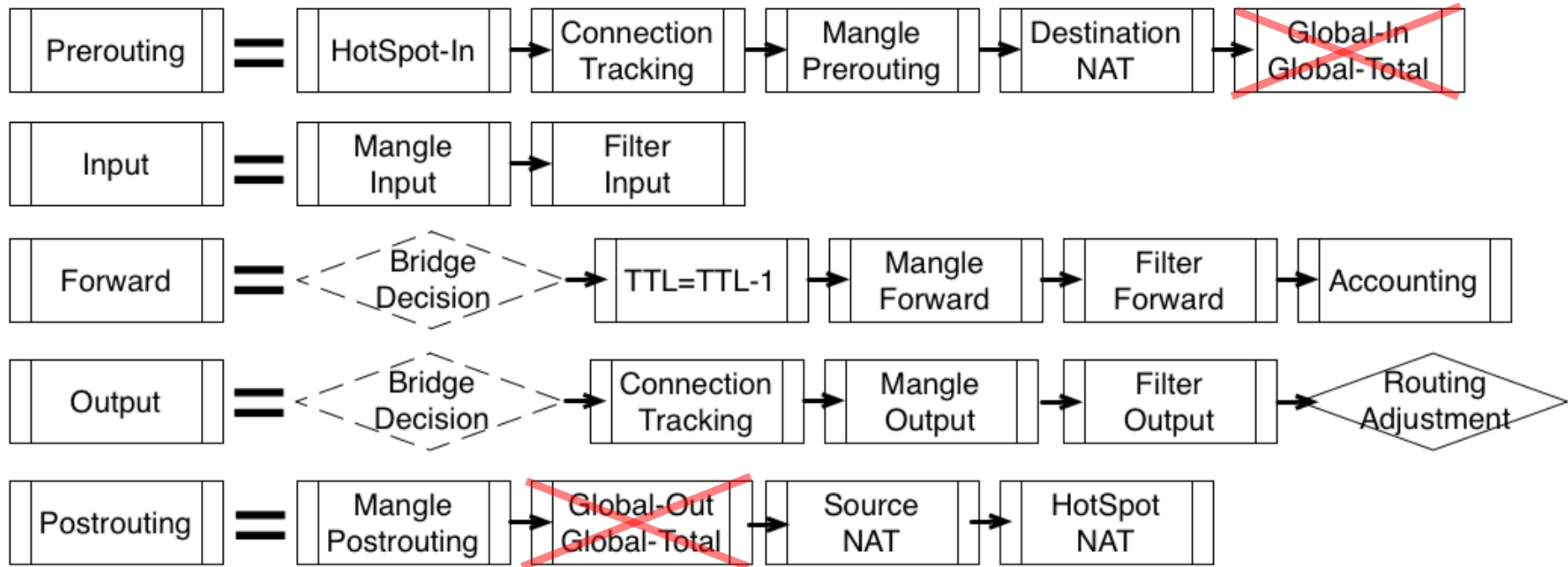
Interface List								
Interface	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tunnel	VLAN	VRRP	Bonding	LTE
✓	✗	📄	🔍					
	Name	Type	MTU	L2 MTU	Tx	Rx	Tx Packet...	Rx Packet (...)
RS	ether1	Ethernet	1500	1590	478.5 Mbps	465.8 Mbps	996 885	970 618
RS	ether2	Ethernet	1500	1590	477.2 Mbps	480.3 Mbps	994 356	1 000 701
RS	ether3	Ethernet	1500	1590	475.1 Mbps	513.4 Mbps	989 969	1 069 736
RS	ether4	Ethernet	1500	1590	476.6 Mbps	492.0 Mbps	993 024	1 025 024
RS	ether5	Ethernet	1500	1590	475.8 Mbps	501.4 Mbps	991 399	1 044 710
RS	ether6	Ethernet	1500	1590	478.4 Mbps	469.2 Mbps	996 816	977 502
RS	ether7	Ethernet	1500	1590	478.1 Mbps	471.7 Mbps	996 120	982 714
RS	ether8	Ethernet	1500	1590	482.7 Mbps	408.8 Mbps	1 005 632	851 693
RS	ether9	Ethernet	1500	1590	477.1 Mbps	487.0 Mbps	994 065	1 014 717
RS	ether10	Ethernet	1500	1590	478.2 Mbps	468.2 Mbps	996 343	975 495
RS	ether11	Ethernet	1500	1590	479.2 Mbps	455.3 Mbps	998 539	948 640
R	ether12	Ethernet	1500	1590				
RS	sfp1	Ethernet	1500	1590				
RS	sfp2	Ethernet	1500	1590				
RS	sfp3	Ethernet	1500	1590				
RS	sfp4	Ethernet	1500	1590				
16 items out of 17								

```
[admin@RouterOS] > interface monitor-traffic aggregate
rx-packets-per-second: 15 577 081
rx-drops-per-second: 0
rx-errors-per-second: 0
rx-bits-per-second: 7.4Gbps
tx-packets-per-second: 15 576 803
tx-drops-per-second: 0
tx-errors-per-second: 0
tx-bits-per-second: 7.4Gbps
-- [Q quit|D dump|C-z pause]
```

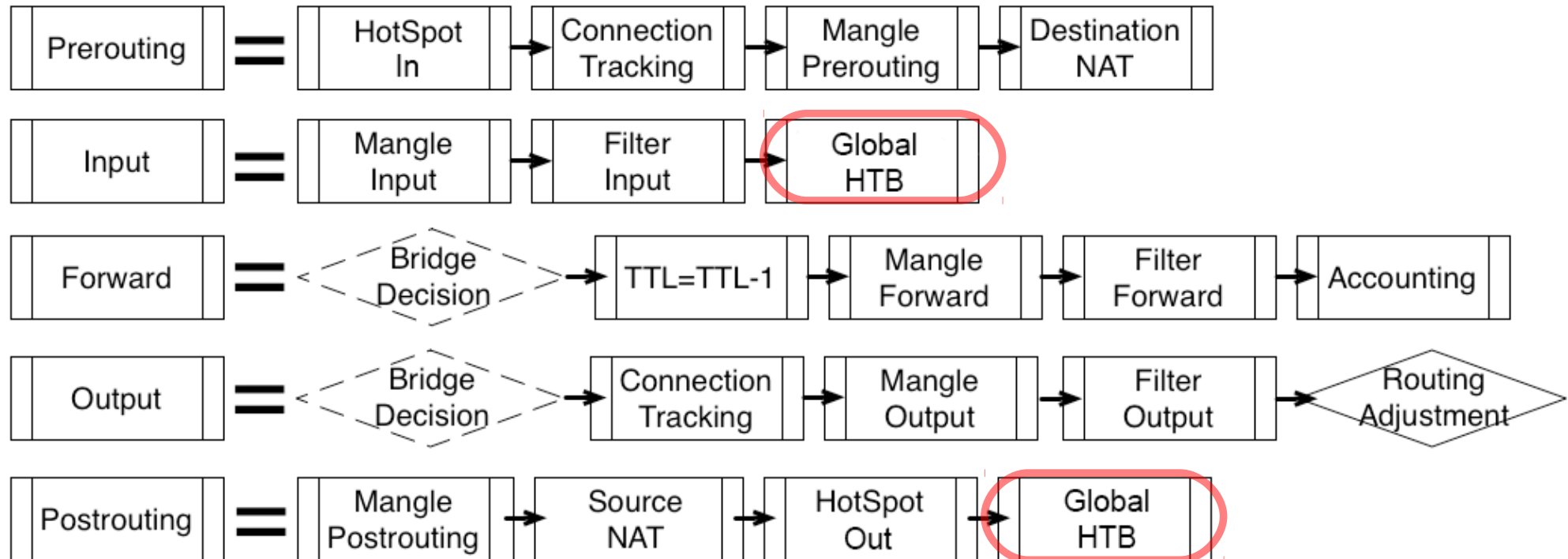
QoS System Reworked

- “Global-in”, “Global-out”, “Global-total” parent in /queue tree are replaced with “Global” that is similar to “Global-total” in v5;
- PCQ queue type is tied to connection tracking and now is NAT aware (just like “/queue simple” and “/ip traffic-flow”);
- Simple queues now happen in a different place - at the very end of “Postrouting” and “Input” sections of RouterOS (Packet Flow Diagram)

HTB in RouterOS v5




































HTB in RouterOS v6



Queues

- Very small overhead for packets that miss existing simple queues
- Queues now easily handles tens of thousands queue rules
- Improved overall router performance when simple queues are used (up to 600%, yes, 600% improvement)

Queue List					
Simple Queues		Interface Queues		Queue Tree	Queue Types
<div><div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div></div><div>Reset Counters</div><div><div>00</div>Reset A</div></div>					
#	Name	Target	Rx Max Limit	Tx Max Limit	
24967	 queue24968	4.4.100.218	1M	1M	
24968	 queue24969	4.4.100.219	1M	1M	
24969	 queue24970	4.4.100.220	1M	1M	
24970	 queue24971	4.4.100.221	1M	1M	
24971	 queue24972	4.4.100.222	1M	1M	
24972	 queue24973	4.4.100.223	1M	1M	
24973	 queue24974	4.4.100.224	1M	1M	
24974	 queue24975	4.4.100.225	1M	1M	
24975	 queue24976	4.4.100.226	1M	1M	
24976	 queue24977	4.4.100.227	1M	1M	
24977	 queue24978	4.4.100.228	1M	1M	
24978	 queue24979	4.4.100.229	1M	1M	
24979	 queue24980	4.4.100.230	1M	1M	
24980	 queue24981	4.4.100.231	1M	1M	
24981	 queue24982	4.4.100.232	1M	1M	
24982	 queue24983	4.4.100.233	1M	1M	
24983	 queue24984	4.4.100.234	1M	1M	
24984	 queue24985	4.4.100.235	1M	1M	
24985	 queue24986	4.4.100.236	1M	1M	
24986	 queue24987	4.4.100.237	1M	1M	
24987	 queue24988	4.4.100.238	1M	1M	
24988	 queue24989	4.4.100.239	1M	1M	
24989	 queue24990	4.4.100.240	1M	1M	
24990	 queue24991	4.4.100.241	1M	1M	
24991	 queue24992	4.4.100.242	1M	1M	
24992	 queue24993	4.4.100.243	1M	1M	
24993	 queue24994	4.4.100.244	1M	1M	
24994	 queue24995	4.4.100.245	1M	1M	
24995	 queue24996	4.4.100.246	1M	1M	
24996	 queue24997	4.4.100.247	1M	1M	
24997	 queue24998	4.4.100.248	1M	1M	
24998	 queue24999	4.4.100.249	1M	1M	
24999	 queue25000	4.4.100.250	1M	1M	
25000 items		0 B queued		0 packets queued	

Simpler Simple Queues

- “target-addresses” and “interface” parameters are joined into one “target” parameter, and supports multiple interfaces match for one queue
- “dst-address” parameter is changed to “dst” parameter and now supports destination interface matching
- Separate “priority” parameter for download, upload and total

Simple Queue Interface v5

The image displays two side-by-side screenshots of the 'New Simple Queue' configuration window, showing different tabs.

Left Window (General Tab):

- Name:** queue_from_v5
- Target Address:** 192.168.1.254
- Target Upload:** ☒ **Target Download:** ☒
- Max Limit:** 20M (Upload) / 20M (Download) bits/s
- Burst:**
 - Burst Limit:** unlimited (Upload) / unlimited (Download) bits/s
 - Burst Threshold:** unlimited (Upload) / unlimited (Download) bits/s
 - Burst Time:** 0 (Upload) / 0 (Download) s
- Time:** 00:00:00 - 1d 00:00:00
- Days:** ☒ sun ☒ mon ☒ tue ☒ wed ☒ thu ☒ fri ☒ sat
- Status:** enabled

Right Window (Advanced Tab):

- P2P:** [Redacted]
- Packet Marks:** [Redacted]
- Dest. Address:** [Redacted]
- Interface:** all
- Limit At:** 2M (Upload) / 2M (Download) bits/s
- Queue Type:** pcq-upload-default (Upload) / pcq-download-default (Download)
- Parent:** none
- Priority:** 8
- Status:** enabled

Buttons (Right Side): OK, Cancel, Apply, Disable, Comment, Copy, Remove, Reset Counters, Reset All Counters, Torch.

Simple Queue Interface v6

The image displays two side-by-side screenshots of the 'New Simple Queue' configuration window, showing different tabs and settings.

Left Screenshot (General Tab):

- Name:** queue_from_v6
- Target:** 192.168.1.254 (highlighted with a red circle)
- Dst.:** ether7 (highlighted with a red circle)
- Target Upload:** 20M
- Target Download:** 20M
- Limit At:** 2M
- Priority:** 6
- Queue Type:** pcq-upload-default
- Parent:** none
- Enabled:** ☒

Right Screenshot (General Tab):

- Name:** queue_from_v6
- Target:** 192.168.1.254
- Dst.:** ether7
- Target Upload:** 20M
- Target Download:** 20M
- Limit At:** 2M
- Priority:** 6 (highlighted with a red circle)
- Queue Type:** pcq-upload-default
- Parent:** none
- Enabled:** ☒

Buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove, Reset Counters, Reset All Counters, Torch.

SCEP Protocol Support

- Simple Certificate Enrollment protocol (SCEP)
- This protocol allows to:
 - get CA certificate from CA server or RA (if used)
 - create self-signed certificate with temporary key
 - send certificate request to the server

as simple as possible.

- More info at:
<http://wiki.mikrotik.com/wiki/Manual:System/Certificates#SCEP>

Other Changes

- Slave flag now will show up for interfaces that are in bridge, bonding or switch group
- “/export compact” now is as default for “/export”, use “/export verbose” to get previous behavior
- dhcp-options now can be specified by mixing different data types
- dhcp-client have custom dhcp-option feature (examples at: /ip dhcp-client option print)

Wireless Advanced Channels

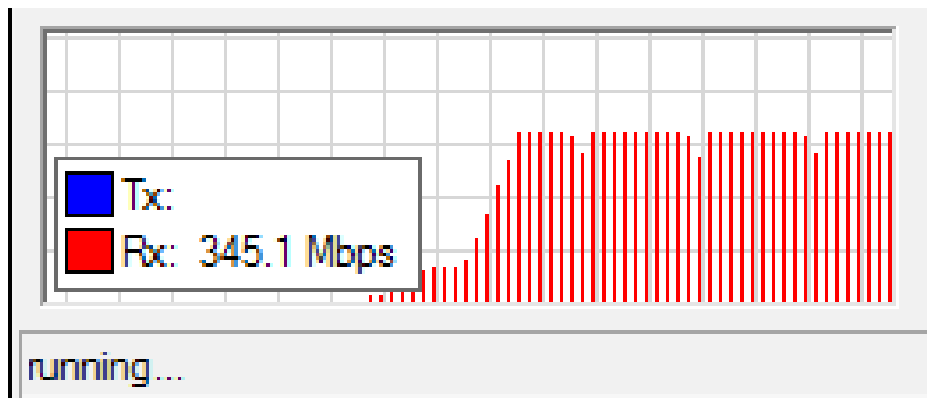
- Works only between Atheros AR92xx chips and only between MikroTik devices
 - center frequency range:
 - 2192-2734mhz
 - 4800-6100mhz
- Choose precise center frequency (0.5MHz step)
- Choose channel width (2.5-30MHz, 0.5MHz step)
- Super-channel license is required to use advanced channels – it is free of charge (only signed document required about proper usage)

Wireless Advanced Channels

- Located in /interface wireless channels
- Allows to name each advanced channel and group them into custom lists
- These names and list names later should be use in wireless clients scan-list, to enable them to see advanced channel APs (old style scan-list entries will not work)
- Custom scan-list options:
 - default, frequency, frequency range
 - advanced channel name or list name

Advanced Channel Test

Current Tx Power	Status	Advanced Status	Traffic	...
Band: 5GHz-N				
Frequency: 5362.5MHz				
Wireless Protocol: 802.11				
Tx/Rx Rate: 27.0Mbps/405.0Mbps				



- Center frequency - 5362.5MHz
- Channel width - 30MHz
- Extension channel – Above
- Maximal data rate – MCS-15, 405Mbps
- Wireless protocol – 802.11n

Questions!!!