Basic guidelines on RouterOS configuration and debugging

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RouterOS is the same everywhere

RouterOS management tools

RouterOS management

- CLI (Command Line Interface)

  https://wiki.mikrotik.com/wiki/Manual:Console

- Webfig

  https://wiki.mikrotik.com/wiki/Manual:Webfig

- TikApp

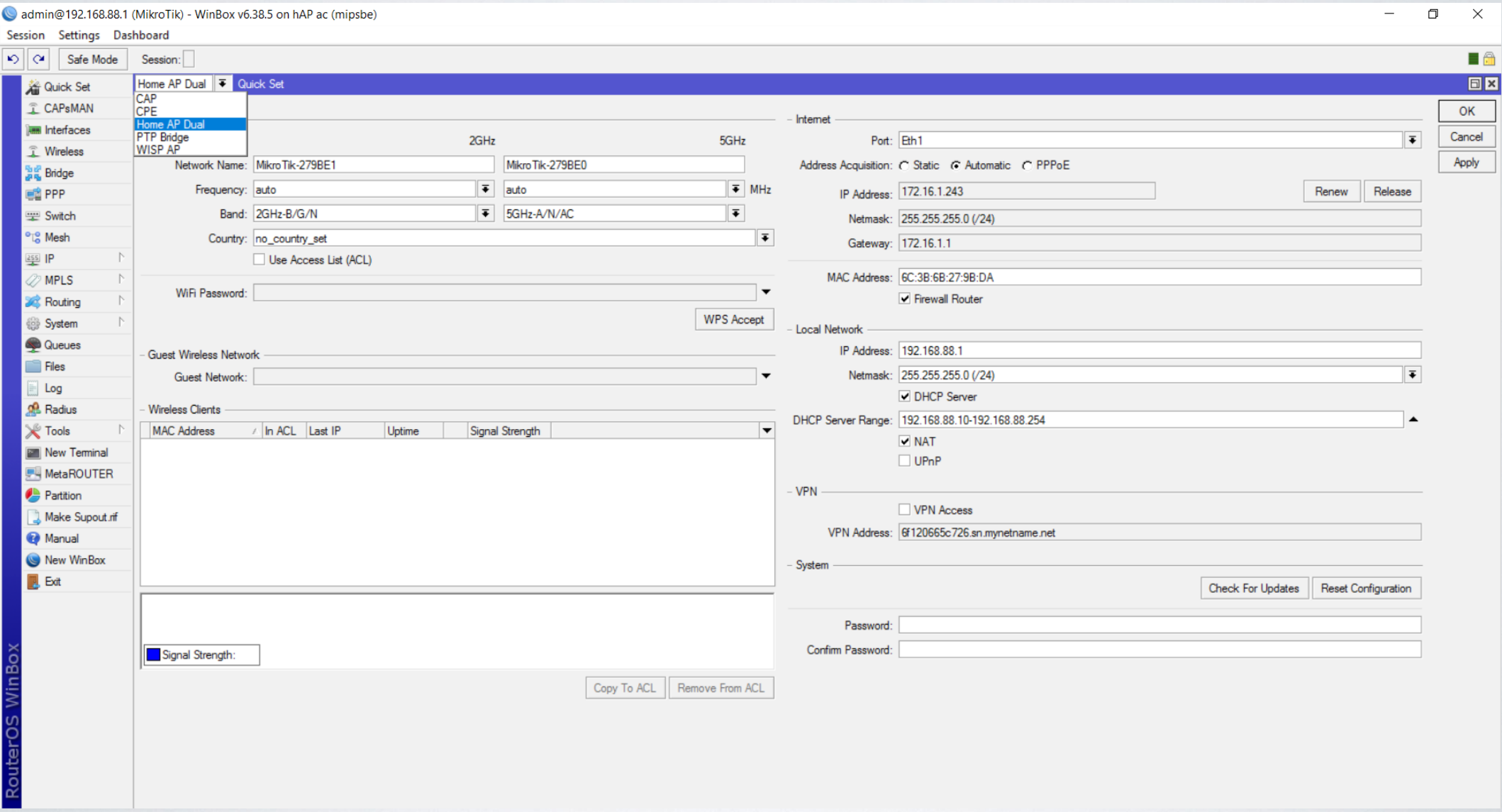
  https://forum.mikrotik.com/viewtopic.php?t=98407

- Winbox

  https://wiki.mikrotik.com/wiki/Manual:Winbox

QuickSet

The fastest way how to configure device



Simple security

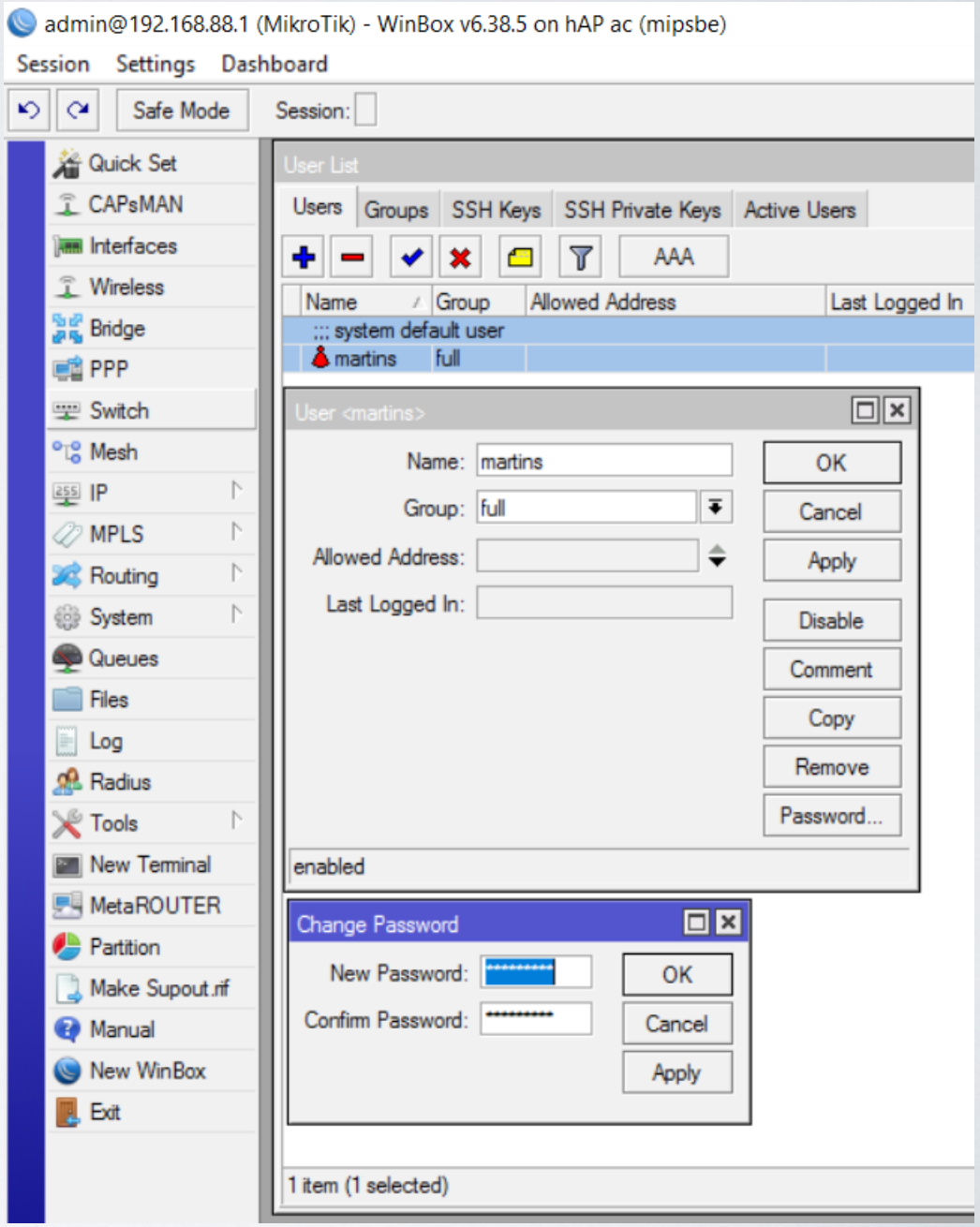
Simple security

- Specify user password

  /user set admin password=***

- Use different username

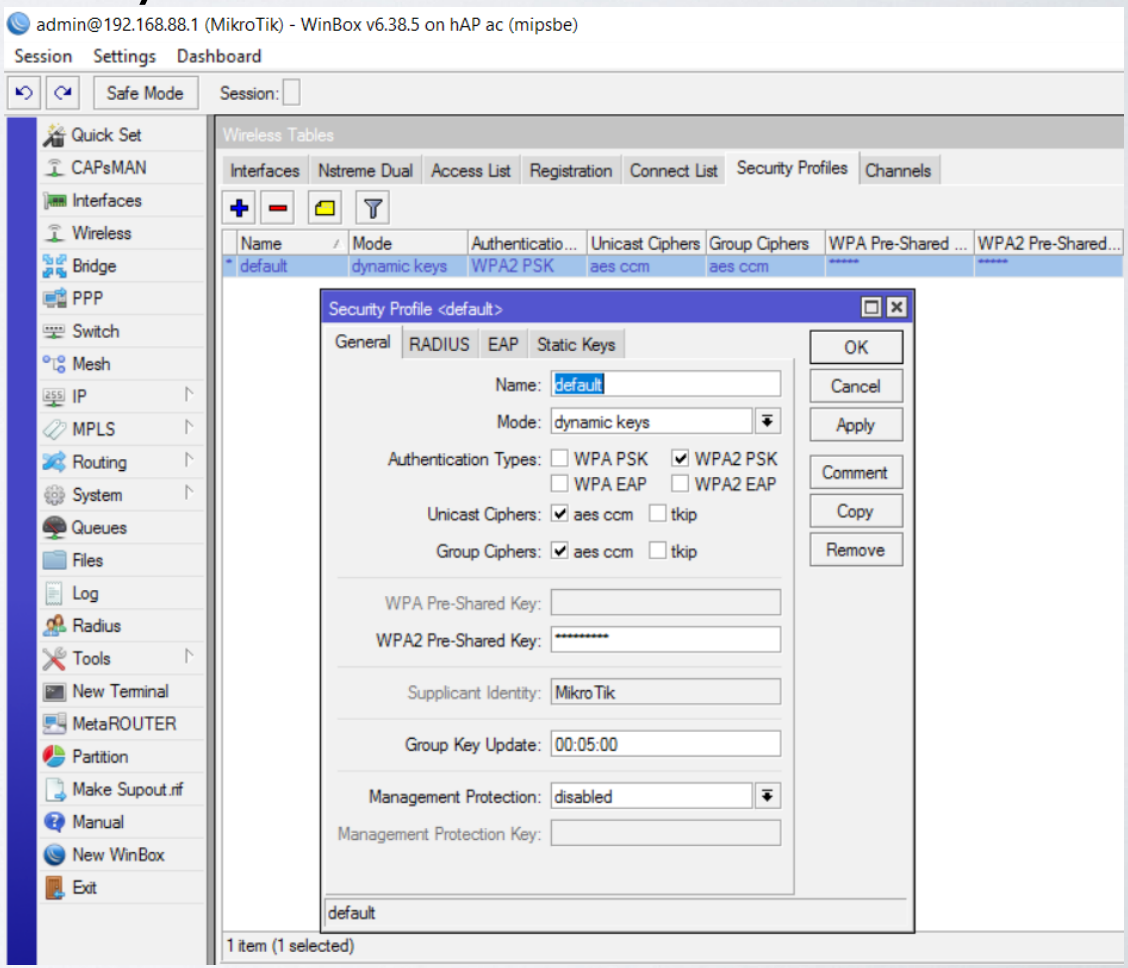
  /user set admin name=martins



Simple security

- Specify password for wireless access

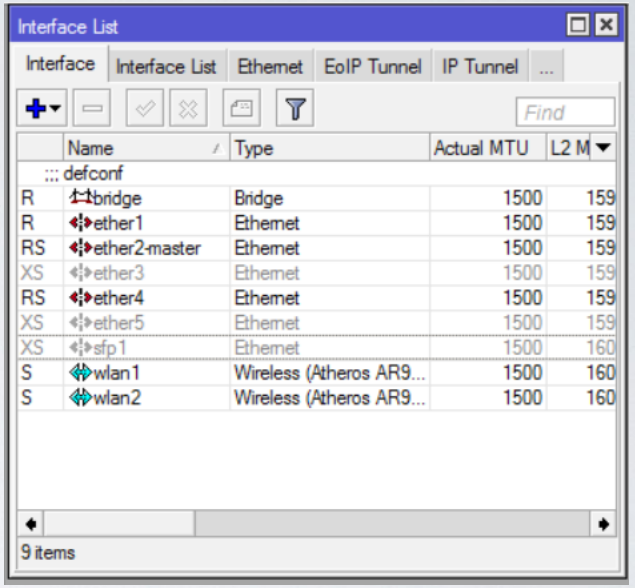
  /interface wireless security-profiles set default= authentication-types=wpa2-psk mode=dynamic-keys wpa2-pre-shared-key=********



Simple security

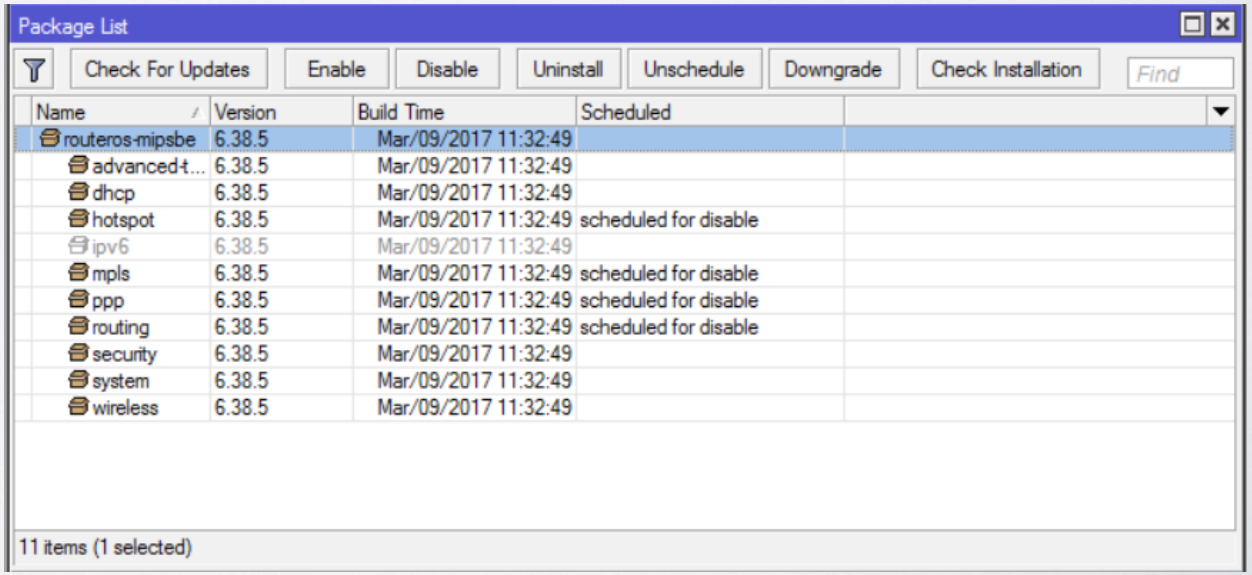
- Disable unused interfaces

  /interface ethernet disable ether3,ether5,sfp1



- Disable unused packages (mainly IPv6)

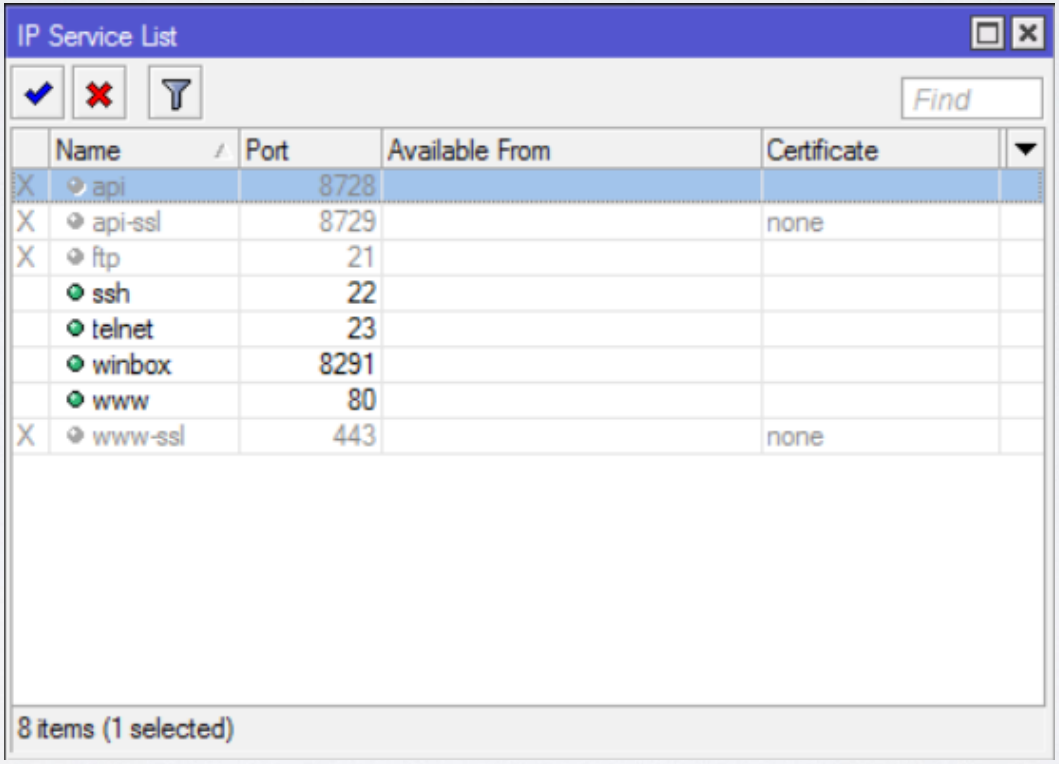
  /system package disable hotspot,ipv6,mpls,ppp,routing



Simple security

- Disable IP/Services

  /ip service disable api,api-ssl,ftp,www-ssl



Simple security

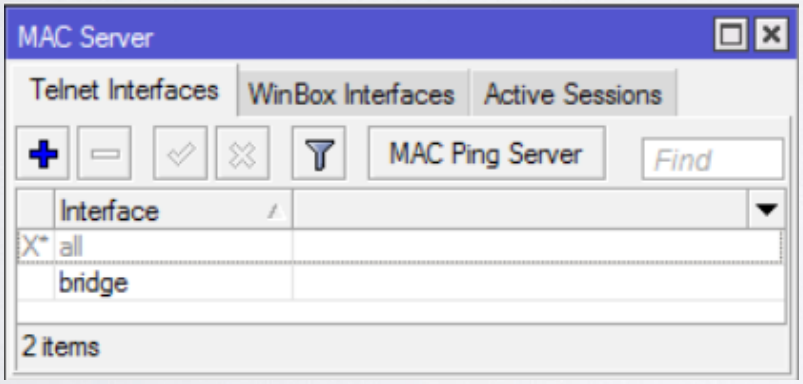
- Adjust MAC access

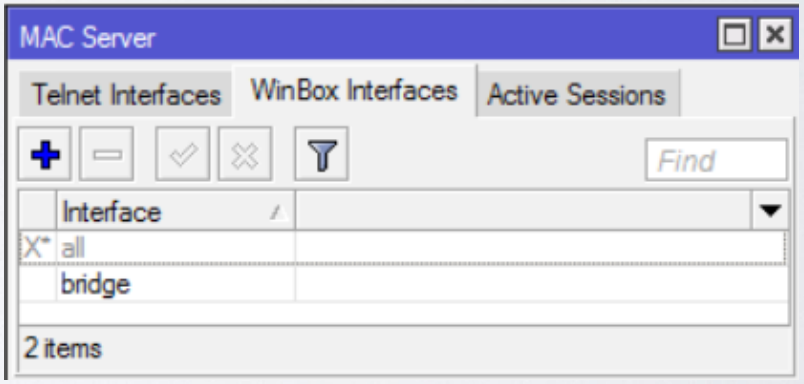
/tool mac-server set [find default=yes] disabled=yes

/tool mac-server add interface=bridge

/tool mac-server mac-winbox set [find default=yes] disabled=yes

/tool mac-server mac-winbox add interface=bridge

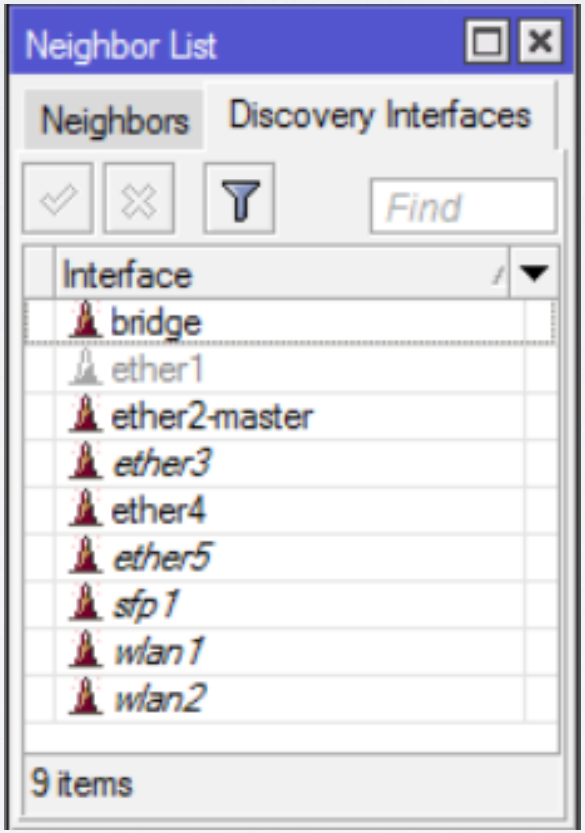




Simple security

- Hide device in Neighbor Discovery

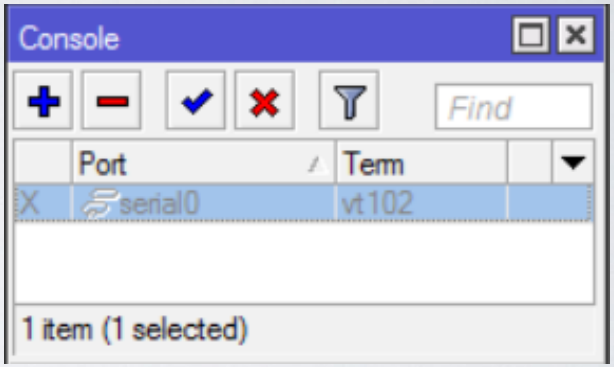
  /ip neighbor discovery set ether1 discover=no



Simple security

- Disable serial port if not used (and if included)

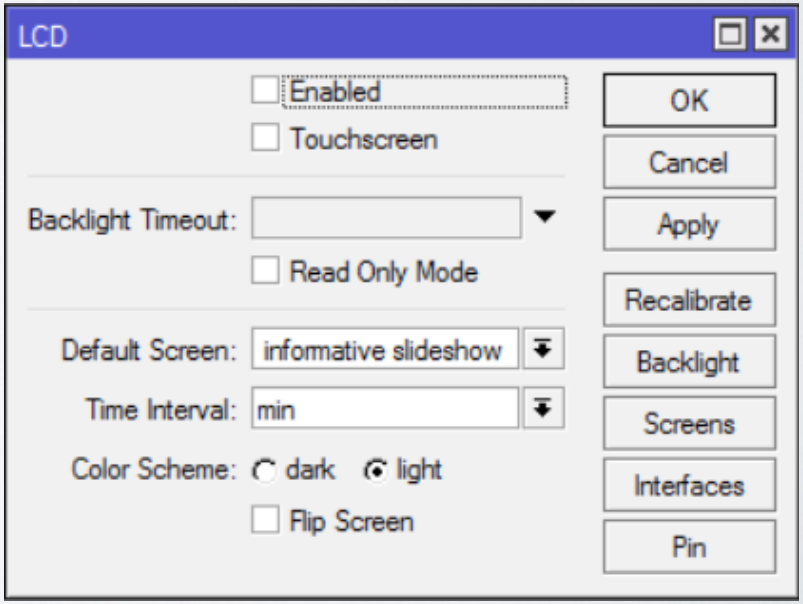
  /system console disable [find where port=serial0]



- Disable LCD

  /lcd set enabled=no

  /lcd set touch-screen=disabled



Simple security

- Protect reset button

  /system routerboard settings set protected-routerboot=enabled reformat-hold-button=30s

  https://wiki.mikrotik.com/wiki/Manual:RouterBOARD_settings#Protected_bootloader

Firewall

Firewall

Two approaches

- Drop not trusted and allow trusted
- Allow trusted and drop untrusted

```
/ip firewall filter add chain=forward action=accept src-address=192.168.88.2 out-interface=ether1
/ip firewall filter add chain=forward action=drop src-address=192.168.88.0/24 out-interface=ether1
```

Firewall

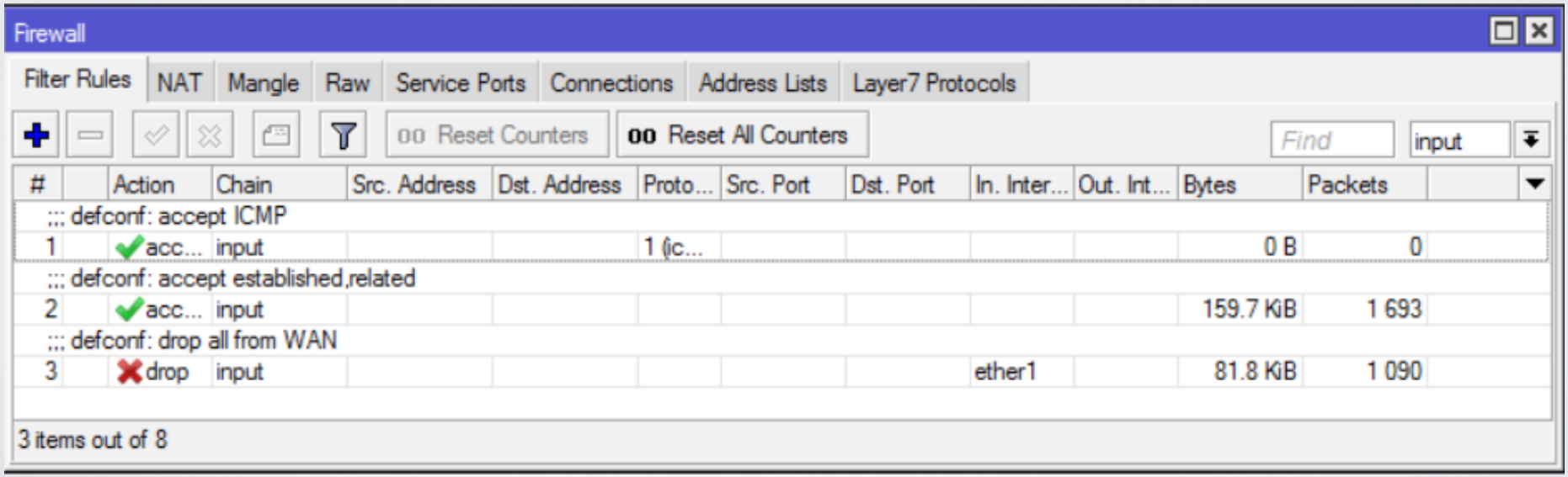
- Secure input

  /ip firewall filter

  add chain=input action=accept protocol=icmp

  add chain=input action=accept connection-state=established,related

  add chain=input action=drop in-interface=ether1



Firewall

- Secure forward

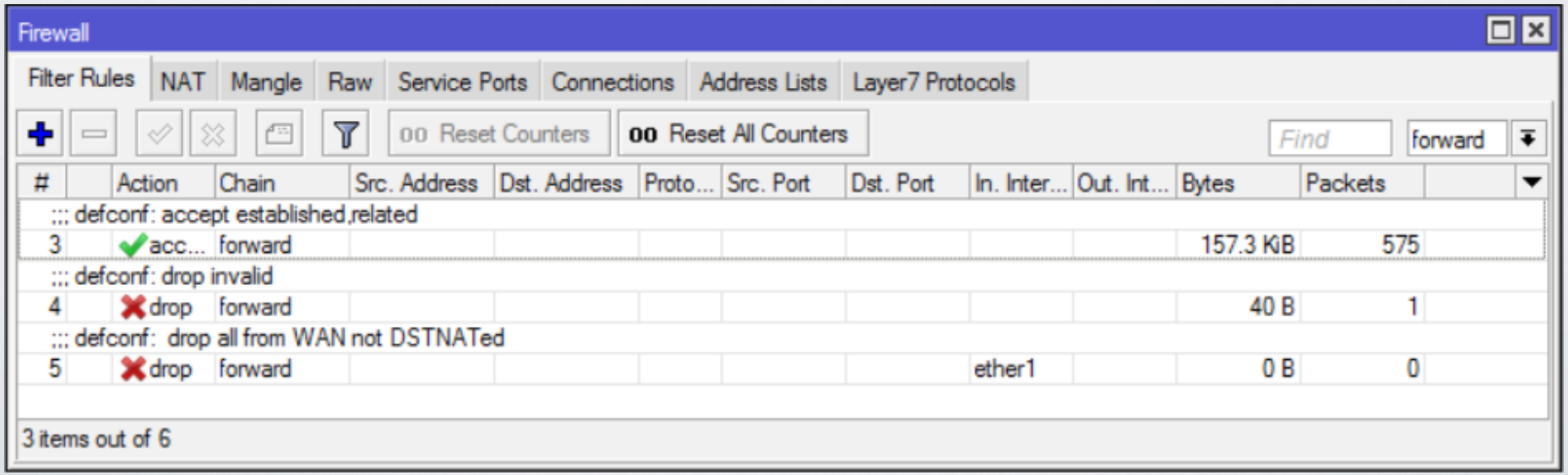
  /ip firewall filter

  add chain=forward action=accept connection-state=established,related

  add chain=forward action=drop connection-state=invalid

  add chain=forward action=drop connection-state=new connection-nat-state=!

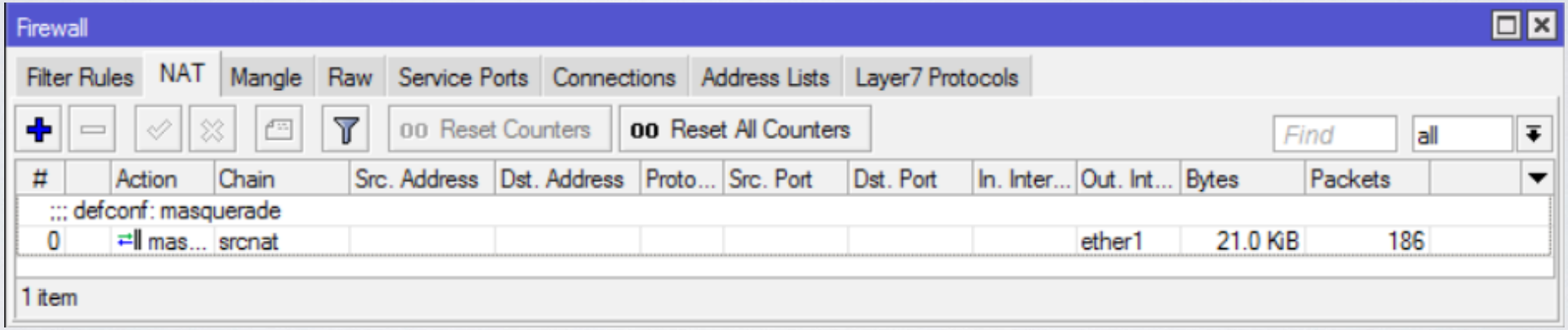
  dstnat in-interface=ether1



Firewall

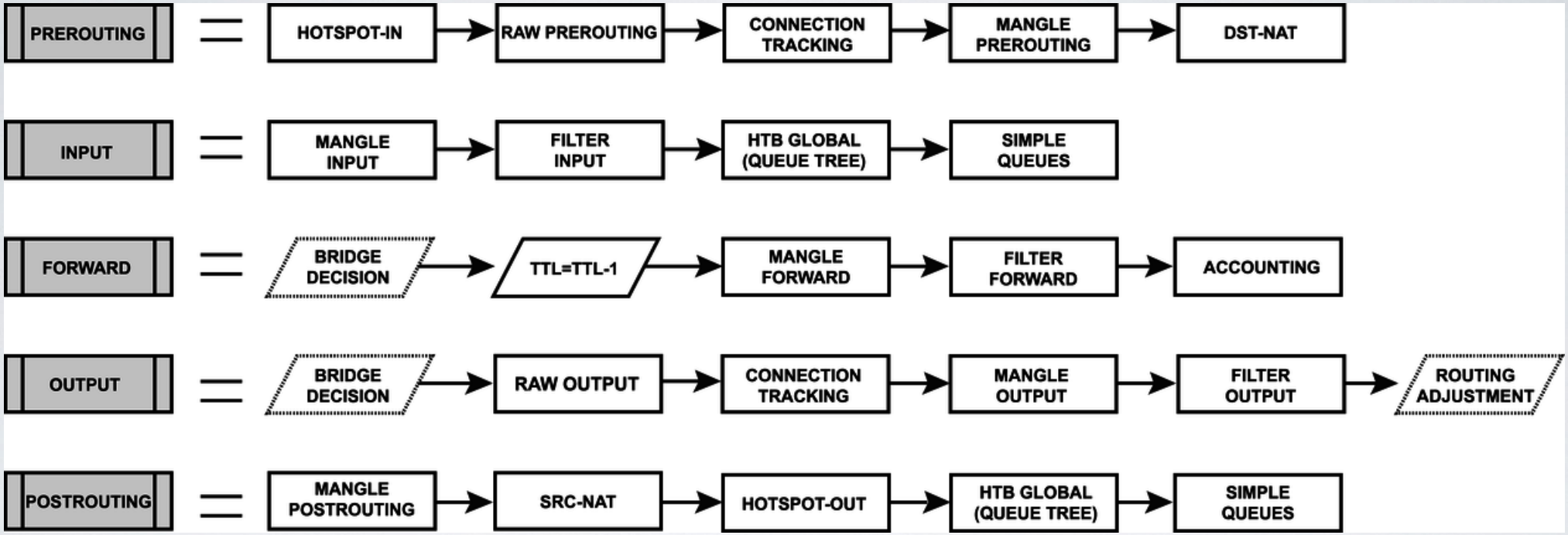
- NAT to outside (if you can, use src-nat instead of masquerade)

  /ip firewall nat add chain=srcnat out-interface=ether1 action=masquerade



https://wiki.mikrotik.com/wiki/Manual:IP/Firewall/NAT#Masquerade

Firewall



https://wiki.mikrotik.com/wiki/Manual:Packet_Flow_v6

Firewall

- NAT to LAN

/ip firewall nat add chain=dstnat in-interface=ether1 protocol=tcp dst-port=22

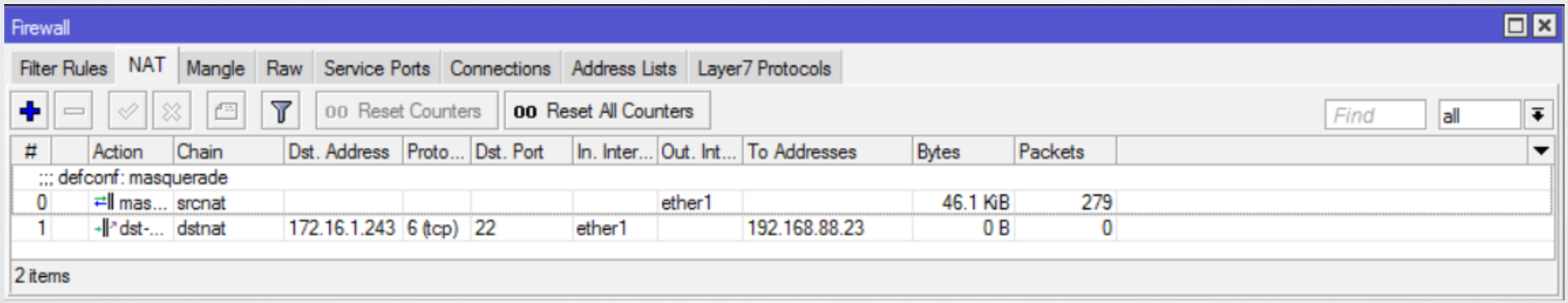
action=dst-nat dst-address=172.16.1.243 to-address=192.168.88.23

Note: In order to make port forwarding work you have to:

Have dst-nat

Have src-nat

Accept traffic in forward chain (example in previous slides)



Firewall

- Hairpin NAT (access local resource through public IP)

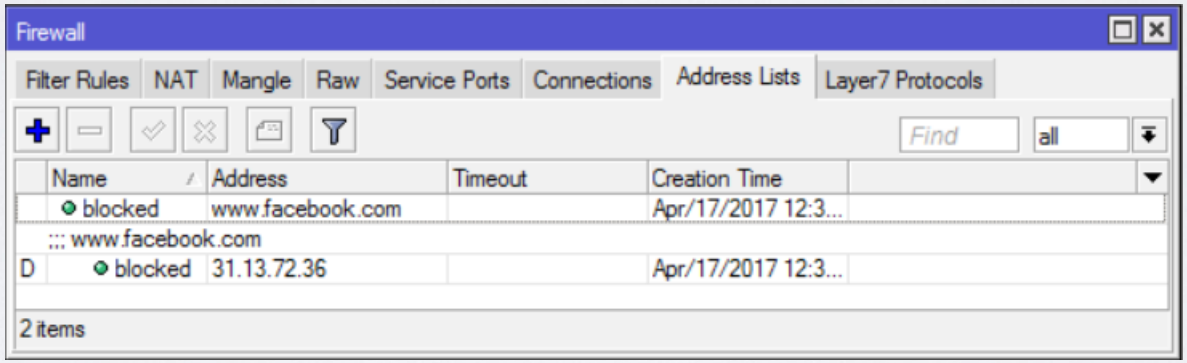
  https://wiki.mikrotik.com/wiki/Hairpin_NAT

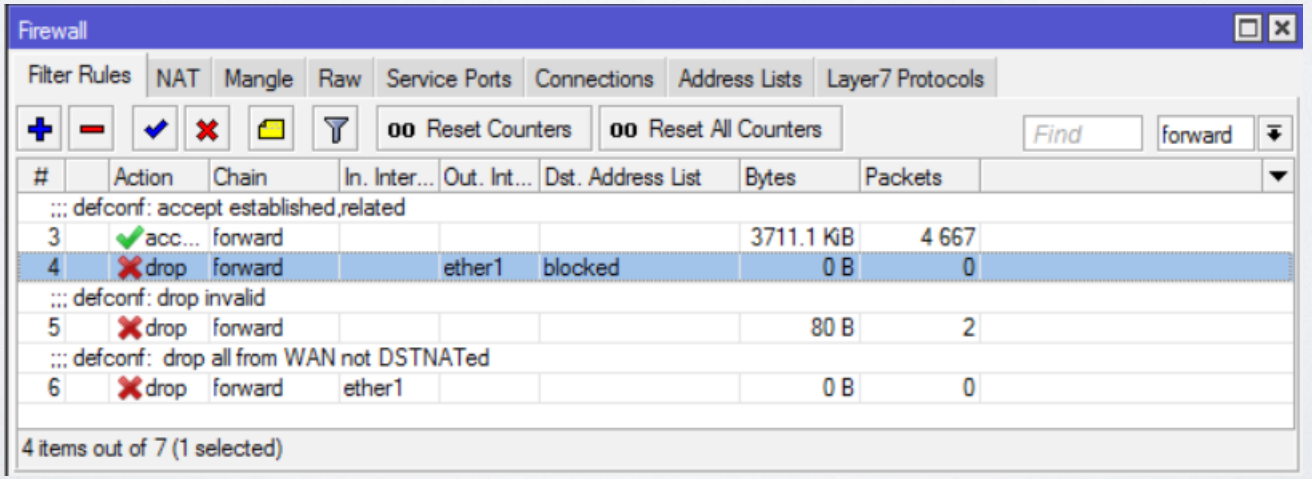
Firewall

- Block specific traffic

  /ip firewall address-list add list=blocked address=www.facebook.com

  /ip firewall filter add chain=forward action=drop dst-address-list=blocked out-interface=ether1





Firewall

- Protect device against attacks if you allow particular access

```
/ip firewall filter
add chain=input protocol=tcp dst-port=22 src-address-list=ssh_blacklist
action=drop
add chain=input protocol=tcp dst-port=22 connection-state=new src-address-
list=ssh_stage2 action=add-src-to-address-list address-list=ssh_blacklist address-
list-timeout=10d
add chain=input protocol=tcp dst-port=22 connection-state=new src-address-
list=ssh_stage1 action=add-src-to-address-list address-list=ssh_stage2 address-list-
timeout=1m
add chain=input protocol=tcp dst-port=22 connection-state=new action=add-src-
to-address-list address-list=ssh_stage1 address-list-timeout=1m
```

Handle bandwidth

FastTrack

- Remember this rule?

  /ip firewall filter

  add chain=forward action=accept connection-state=established,related

- Add FastTrack rule before previous one

  /ip firewall filter

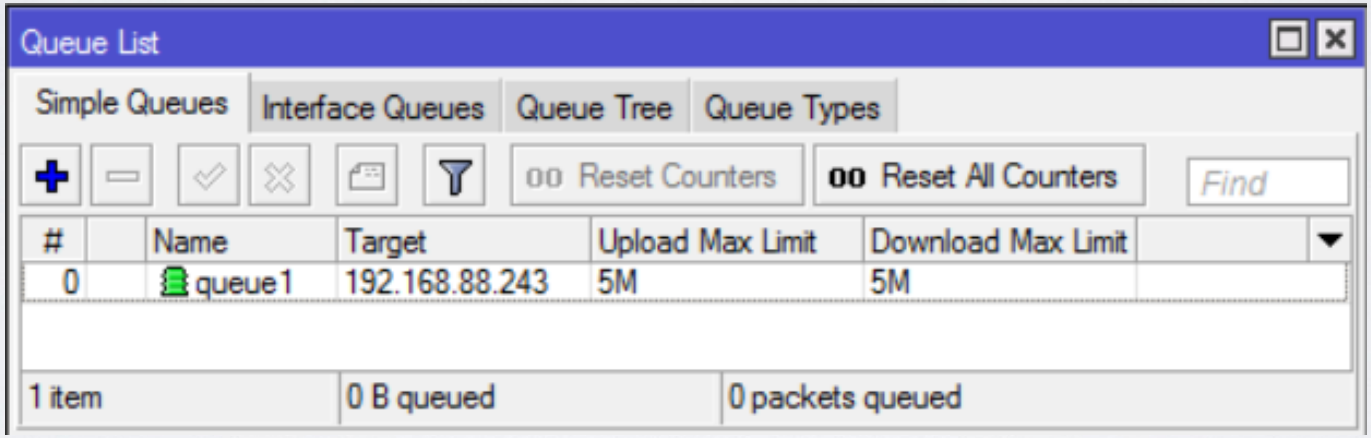
- add chain=forward action=fasttrack-connection connection-

  state=established,related

Queues

- Add queues to limit traffic for specific resources

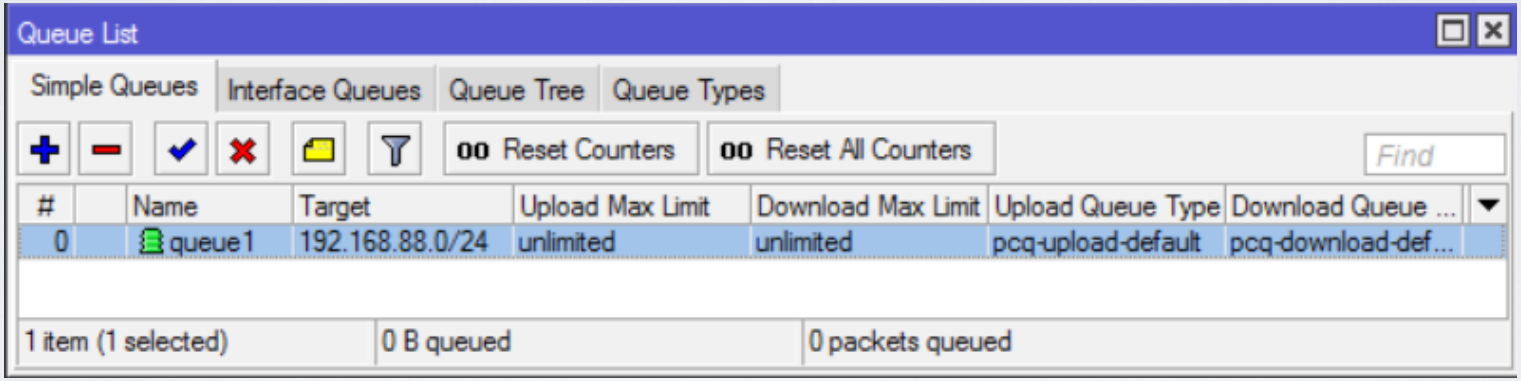
  /queue simple add name=private target=192.168.88.243 max-limit=5M/5M



Queues

- Add queues to limit traffic equally (PCQ)

  /queue simple add target-addresses=192.168.88.0/24 queue=pcq-upload-default/pcq-download-default



Few advices about queues

https://wiki.mikrotik.com/wiki/Tips_and_Tricks_for_Beginners_and_Experienced_Users_of_RouterOS#Queues

What to do when problem appears?

Logging

- Use logging for firewall

  /ip firewall filter set [find where src-address-list=ssh_blacklist] log=yes log-prefix=BLACKLISTED:

- Use logging for debug topics

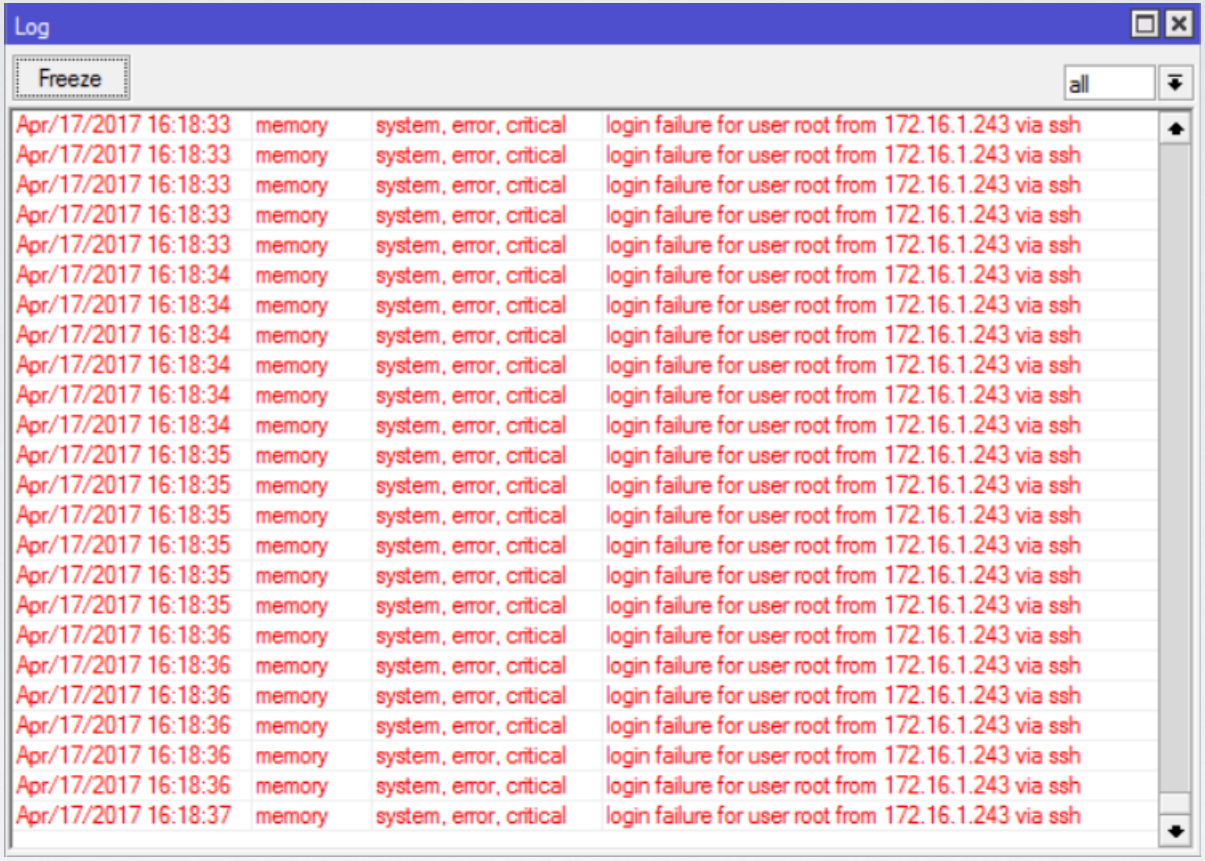
  /system logging add topics=l2pt,debug action=memory

- Logging to disk or remote server

  /system logging action set disk disk-file-name=l2tp_logs disk-file-count=5 disk-lines-per-file=1000

  /system logging action set remote remote=192.168.88.3

Logging



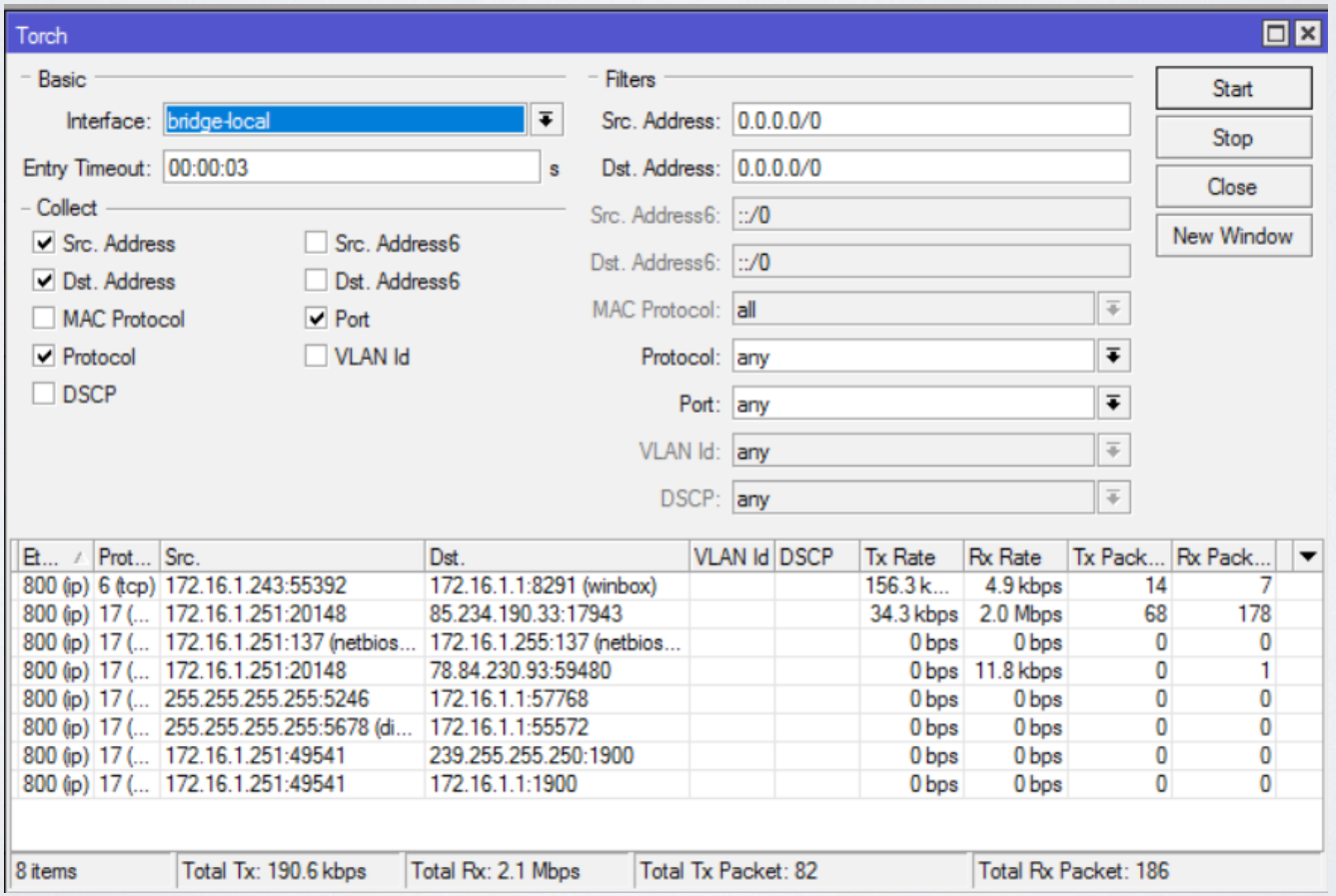
https://wiki.mikrotik.com/wiki/Manual:System/Log

Debugging tools

- Torch

  Analyse processed traffic

  https://wiki.mikrotik.com/wiki/Manual:Troubleshooting_tools#Torch_.28.2Ftool_torch.29

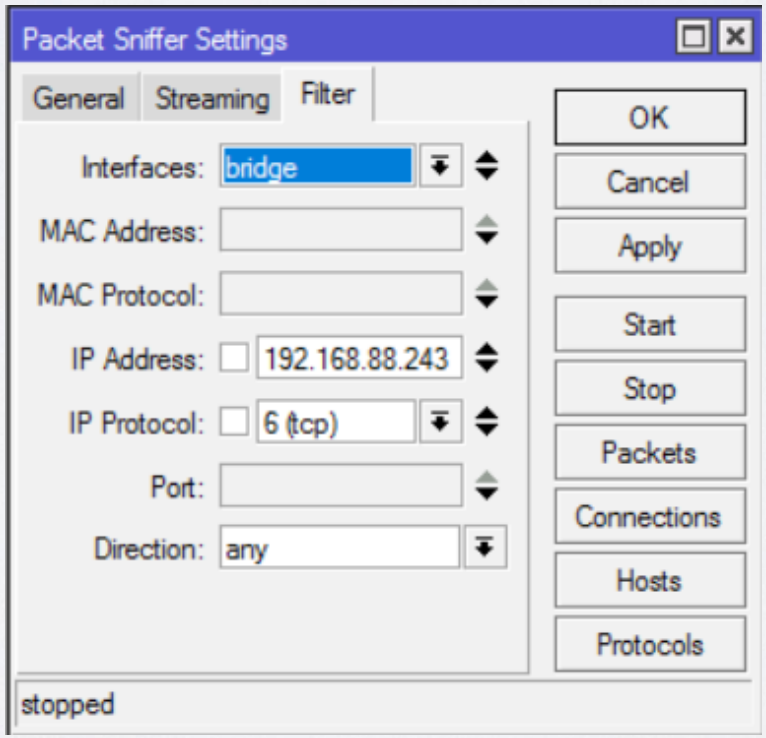


Debugging tools

- Sniffer

  Analyse processed packets

  https://wiki.mikrotik.com/wiki/Manual:Troubleshooting_tools#Packet_Sniffer_.28.2F
  tool_sniffer.29

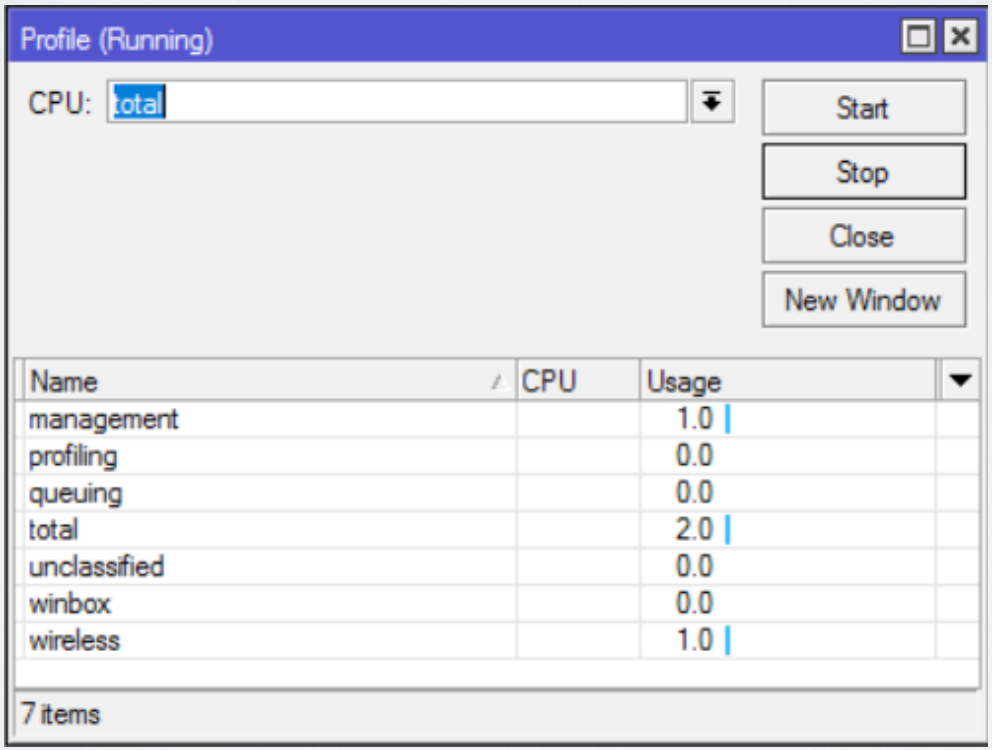


Debugging tools

- Profiler

  Find out current CPU usage

  https://wiki.mikrotik.com/wiki/Manual:Tools/Profiler

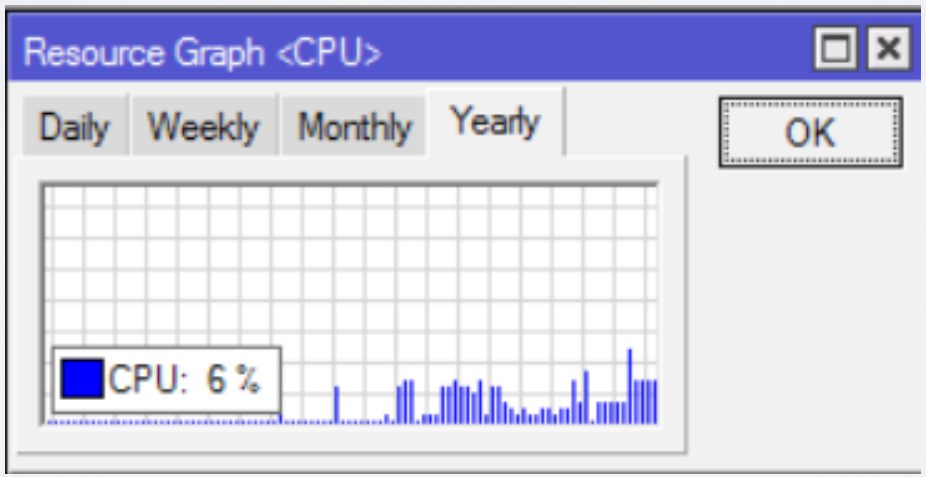


Debugging tools

- Graphing

  Find out information about Interfaces/Queues/Resources per interval:

  https://wiki.mikrotik.com/wiki/Manual:Tools/Graphing



Debugging tools

- The Dude

  Powerful network monitor tool:

  https://wiki.mikrotik.com/wiki/Manual:The_Dude

Keep features and fixes up-to-date

Upgrade device

- **Release candidate**

  The most up-to-date version (hardly tested) with all possible features (also half-implemented) and fixes

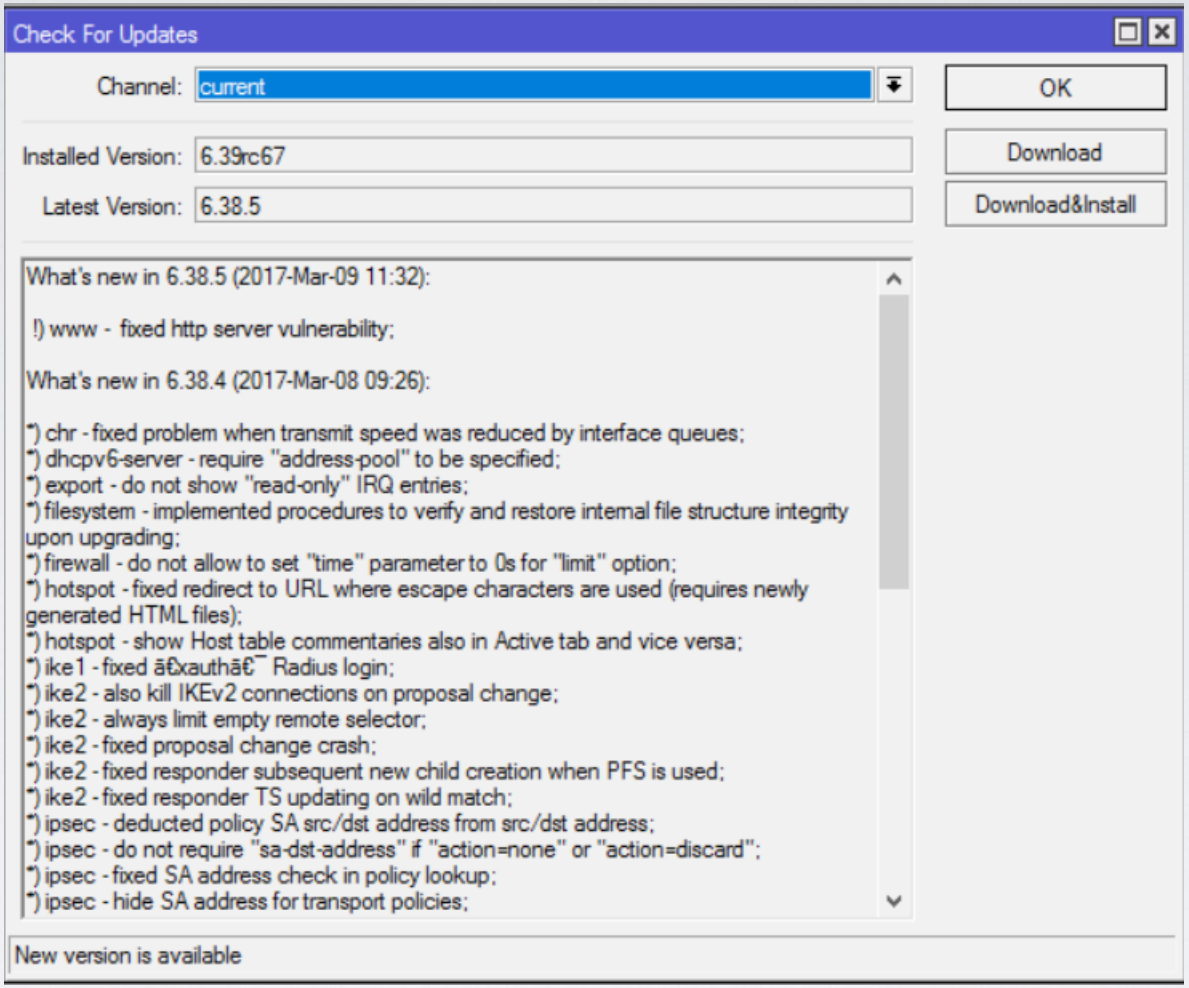
- **Current**

  Latest full release (tested on many different scenarios for long time) with all fully implemented features

- **Bugfix**

  Latest full release (tested on many different scenarios for long time and admitted as trustworthy) with all safe fixes

Upgrade device



https://wiki.mikrotik.com/wiki/Manual:Upgrading_RouterOS

What to do when software stops working?

Resolve problems

- Backup RouterBOOT

    1) Power device off, press and hold reset button

    2) Power device on and after 1-2 seconds release button

- Netinstall

    1) Test Netinstall

        https://wiki.mikrotik.com/wiki/Manual:Netinstall

    2) Try to re-install any other router

- Reset device

        https://wiki.mikrotik.com/wiki/Manual:Reset

Resolve problems

- Serial port

  1) Shows all available information (also booting)

  2) Will work if problem is related to Layer2/Layer3 connectivity and/or interfaces themselves

- Exchange device
- Choose more powerful device (or multiple devices)

I can not figure it out by myself

Configuration issues

- Consultants/Distributors:
  - https://mikrotik.com/consultants
  - https://mikrotik.com/buy
- Ask for help in forum:
  - https://forum.mikrotik.com/
- Look for an answer in manual
  - https://wiki.mikrotik.com/wiki/Main_Page

What to do when hardware stops working?

Hardware issues

- Replace involved accessories
  - Power adapter
  - PoE
  - Cables
  - Interfaces (SFP modules, wireless cards, etc.)
  - Power source

Support

Software issues

- Configuration is not working properly

  Logs and supout file;

  https://wiki.mikrotik.com/wiki/Manual:Support_Output_File

- Out of memory

  1) Upgrade device (mandatory)

  2) Reboot device and generate supout file (normal situation)

  3) When RAM is almost full generate another supout file

  (problematic situation)

Support

- Briefly explain what has happened
- When it happens
- What did you do to make it happen
- Send all files (mentioned in previous slides depending on problem)
- Do everything what is asked, if it is possible
- Make notes and document results (even if problem persists)
- Make new files after configuration changes
- Reply within same ticket and provide new information

Feature requests?
Suggestions?

Thank you!