

# MikroTik lifehacking

Daniel Starnowski

# About me

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What is lifehacking

MikroTik lifehacking

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MikroTik live hacking

Disclaimer: No RouterBOARDS were harmed in the making of this presentation

# OK, so what lifehacking is?



Source: <http://www.hometheatrequipment.com/general-discussion-10/lifehacking-5772/>

# Really, what is lifehacking about?



source: <http://wonderfulengineering.com/100-clever-life-improving-ideas-that-you-can-use-in-everyday-life/>

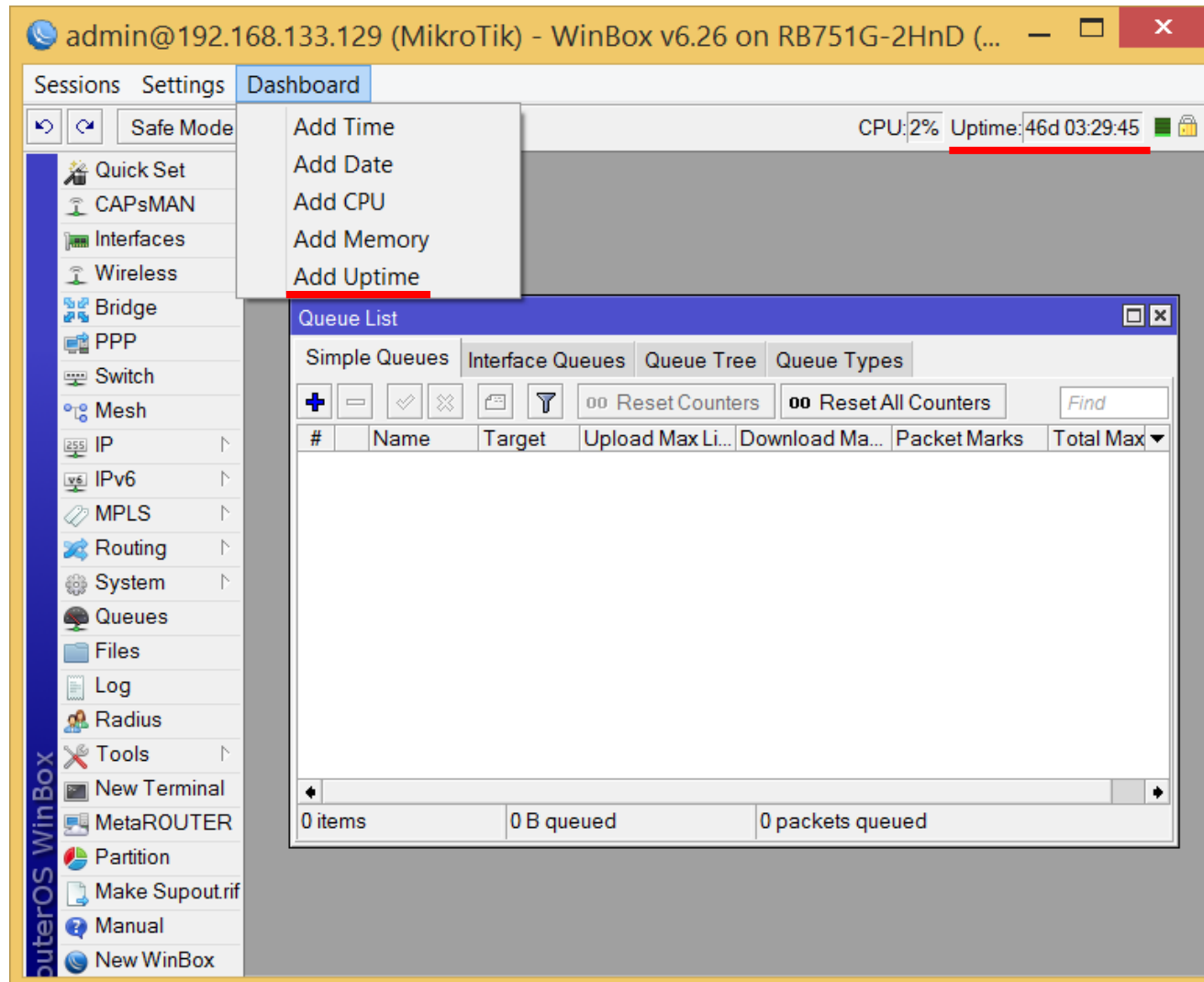
# MikroTik lifehacking – why, for whom?

- The presentation target is to INSPIRE, not to teach 😊
- Some examples of my private MikroTik lifehacks, which – after I started using – made my life easier
- You may be using some of them already

# Problem example – WinBox connection frozen

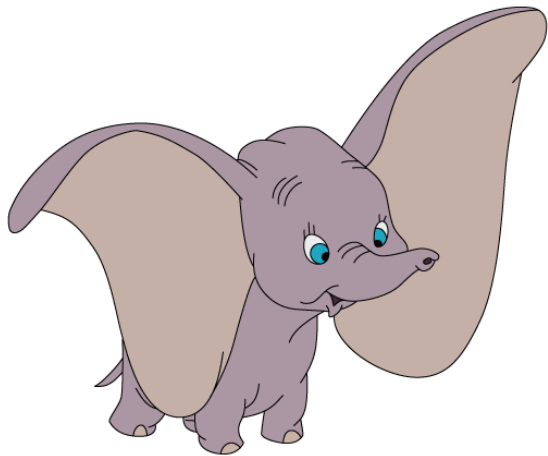
- Sometimes, when loosing connectivity to MikroTik router, WinBox disconnects after time (~20 seconds)
- Before the time – **no sign** of connectivity problems
- Empty lists of items (IP addresses, etc.) in WinBox can be caused by temporary connection loss
- SOLUTION: always keep **uptime** shown in WinBox window! 😊

# Problem example – WinBox connection frozen





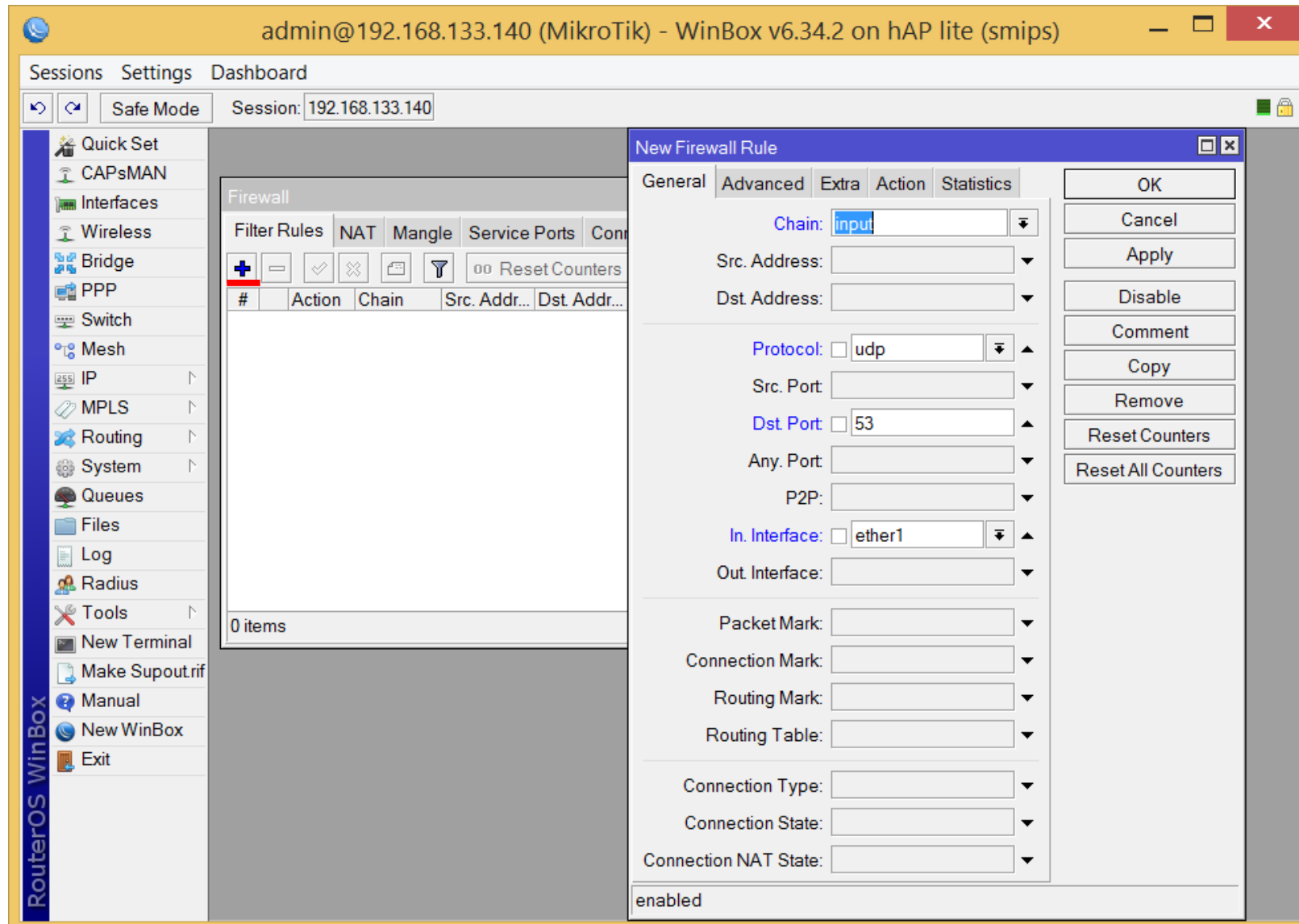
And now for something  
completely different



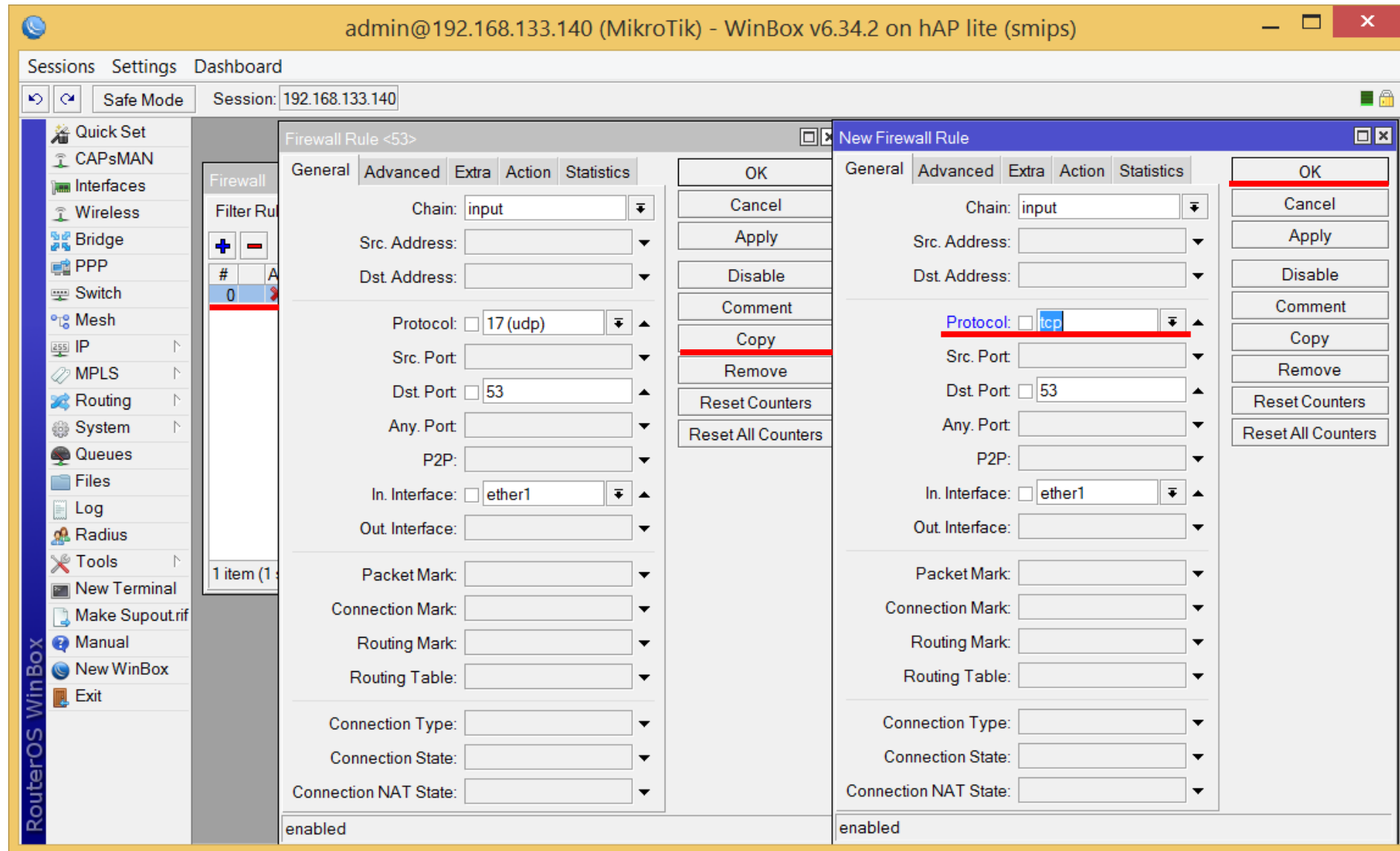
# Copy – not a “hack”, but often forgotten

- WinBox has a “**Copy**” button, that speeds things up!
- Example – create rules blocking DNS connection from not trusted addresses
- Chain=input, protocol=udp, port=53, src-address-list, action...
- I said “rules”, DNS can also use TCP...
- How will you do this one? Add new one, or copy the existing? 😊

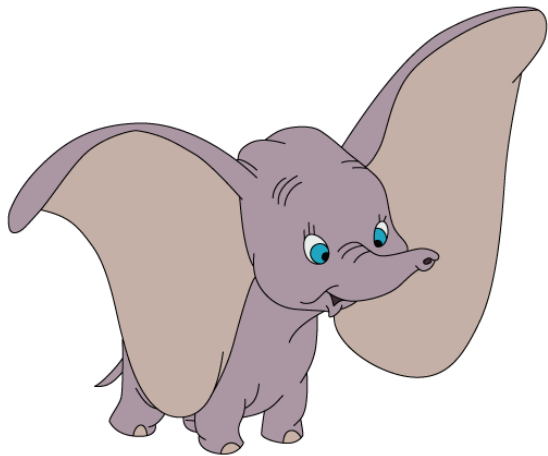
# Copy – not a “hack”, but often forgotten



# Copy – not a “hack”, but often forgotten



And now for something  
completely different



# Learn how to use CLI, it's not difficult!

- CLI can often speed things up – learn, how to use it 😊
- It's not difficult – just configure something in WinBox, then go to New Terminal and see, how it was configured
- Find the right section in terminal
- Use **print** to see, what is configured there
- Use **export** to see, how it is configured
- Use **<TAB>** and **?** to see available options

# CLI – example with IP addresses

The screenshot shows the MikroTik WinBox interface. The title bar reads "admin@192.168.1.1 (MikroTik) - WinBox v6.34.2 on hAP lite (smips)". The main menu includes "Sessions", "Settings", and "Dashboard". Below this, there are navigation buttons for "Safe Mode" and "Session: 192.168.1.1".

The left sidebar contains a tree view of configuration categories. The "IP" category is expanded, and the "Addresses" sub-item is selected and highlighted with a red line. Other sub-items include ARP, Accounting, Cloud, DHCP Client, DHCP Relay, DHCP Server, DNS, Firewall, Hotspot, IPsec, Neighbors, Packing, and Pool.

The main content area displays the "Address List" configuration window. It features a table with the following data:

	Address	Network	Interface
D	172.29.13.161/30	172.29.13.160	ether1
	192.168.1.1/24	192.168.1.0	LAN

The "Addresses" row is highlighted with a red line. The window also includes a search bar labeled "Find" and a status bar at the bottom indicating "2 items".

# CLI – example with IP addresses

- Using <TAB>

```
Terminal
MMM      MMM      KKK      TTTTTTTTTT      KKK
MMMM     MMMM     KKK      TTTTTTTTTT      KKK
MMM MMMM MMM III KKK KKK RRRRRR      OOOOOO      TTT      III KKK KKK
MMM MM  MMM III KKKKK RRR RRR OOO OOO TTT      III KKKKK
MMM      MMM III KKK KKK RRRRRR      OOO OOO TTT      III KKK KKK
MMM      MMM III KKK KKK RRR RRR OOOOOO      TTT      III KKK KKK

MikroTik RouterOS 6.34.2 (c) 1999-2015      http://www.mikrotik.com/

[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]       Completes the command/word. If the input is ambiguous,
            a second [Tab] gives possible options

/           Move up to base level
..         Move up one level
/command    Use command at the base level
[admin@MikroTik] >
caps-man    driver      ip      mpls  queue  snmp      tool  blink  password  redo
certificate file      ipv6   port  radius special-login user  export  ping      setup
console     interface log    ppp   routing system  beep  import  quit      undo
[admin@MikroTik] >
```



# CLI – example with IP addresses

- Typing “ip” and using <TAB> again

```
Terminal
MMM MM  MMM  III  KKKKK  RRR RRR  OOO  OOO  TTT  III  KKKKK
MMM    MMM  III  KKK KKK  RRRRRR  OOO  OOO  TTT  III  KKK KKK
MMM    MMM  III  KKK  KKK  RRR  RRR  OOOOOO  TTT  III  KKK  KKK

MikroTik RouterOS 6.34.2 (c) 1999-2015      http://www.mikrotik.com/

[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]       Completes the command/word. If the input is ambiguous,
            a second [Tab] gives possible options

/           Move up to base level
..         Move up one level
/command    Use command at the base level
[admin@MikroTik] >
caps-man    driver      ip    mpls  queue  snmp      tool  blink  password  redo
certificate file      ipv6  port  radius special-login user  export  ping      setup
console     interface log   ppp   routing system    beep  import  quit      undo
[admin@MikroTik] > ip
accounting  cloud      dhcp-server  hotspot  packing  route  socks  traffic-flow
address    dhcp-client dns          ipsec    pool     service ssh    upnp
arp         dhcp-relay firewall     neighbor proxy   settings tftp  export
[admin@MikroTik] > ip
```

# CLI – example with IP addresses

- Using **print** in /ip address

```
Terminal
[?] Gives the list of available commands
command [?] Gives help on the command and list of arguments

[Tab] Completes the command/word. If the input is ambiguous,
a second [Tab] gives possible options

/ Move up to base level
.. Move up one level
/command Use command at the base level
[admin@MikroTik] >
caps-man driver ip mpls queue snmp tool blink password redo
certificate file ipv6 port radius special-login user export ping setup
console interface log ppp routing system beep import quit undo
[admin@MikroTik] > ip
accounting cloud dhcp-server hotspot packing route socks traffic-flow
address dhcp-client dns ipsec pool service ssh upnp
arp dhcp-relay firewall neighbor proxy settings tftp export
[admin@MikroTik] > ip address
[admin@MikroTik] /ip address> pri
Flags: X - disabled, I - invalid, D - dynamic
# ADDRESS NETWORK INTERFACE
0 192.168.1.1/24 192.168.1.0 LAN
1 D 172.29.13.161/30 172.29.13.160 ether1
[admin@MikroTik] /ip address> █
```

# CLI – example with IP addresses

- Using **export** in /ip address

```
Terminal
/          Move up to base level
..         Move up one level
/command   Use command at the base level
[admin@MikroTik] >
caps-man   driver      ip      mpls   queue  snmp      tool  blink  password  redo
certificate file      ipv6   port   radius special-login user  export ping      setup
console    interface log     ppp    routing system    beep  import quit      undo
[admin@MikroTik] > ip
accounting cloud      dhcp-server hotspot  packing route    socks  traffic-flow
address    dhcp-client dns        ipsec   pool    service ssh     upnp
arp        dhcp-relay firewall  neighbor proxy    settings tftp   export
[admin@MikroTik] > ip address
[admin@MikroTik] /ip address> pri
Flags: X - disabled, I - invalid, D - dynamic
# ADDRESS NETWORK INTERFACE
0 192.168.1.1/24 192.168.1.0 LAN
1 D 172.29.13.161/30 172.29.13.160 ether1
[admin@MikroTik] /ip address> export
# feb/24/2016 23:37:32 by RouterOS 6.34.2
# software id = 1VWV-4NDH
#
/ip address
add address=192.168.1.1/24 interface=LAN network=192.168.1.0
[admin@MikroTik] /ip address>
```

# Learn how to use CLI, really!

- Most sections are easy to find
- **IP -> Firewall -> Filter Rules** can be found in **/ip firewall filter**
- Sometimes small differences
- **Wireless** in WinBox, but **/interface wireless** in CLI
- **System -> Users** in WinBox, but **/user** in CLI
- Or just type **/export** to analyse whole configuration

# Prepare CLI rules for “massive” configuration

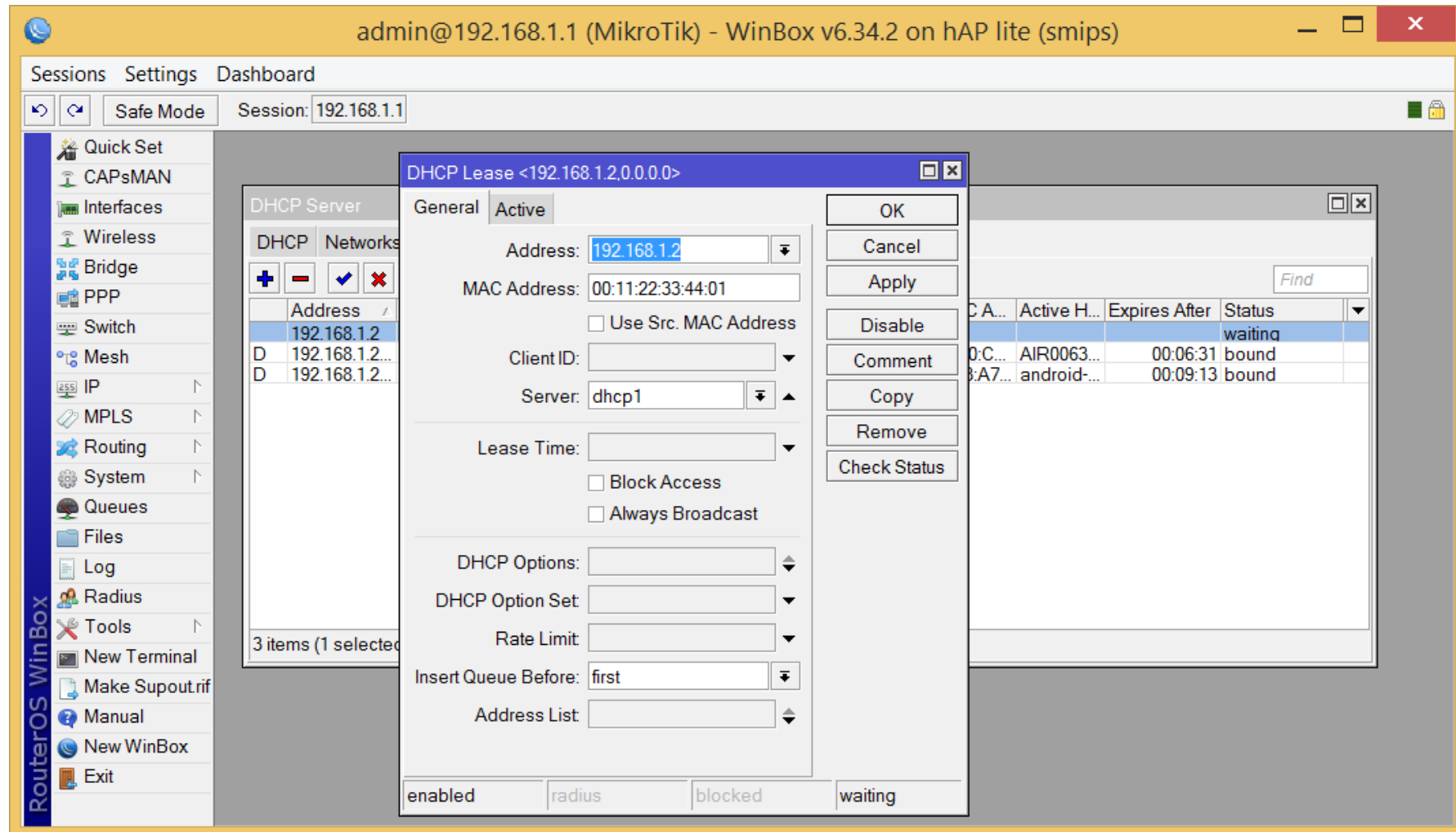
- Imagine, that your MikroTik router is running DHCP server
- You get a spreadsheet with a list of 200 IP and MAC addresses of the devices that need to be added statically to the DHCP server
- Will you click “+”, copy-paste them, and click “**OK**” 200 times? 😊

# Prepare CLI rules for “massive” configuration

	A	B	C	D	E	F
37		192.168.1.38	00:11:22:33:44:37			
38		192.168.1.39	00:11:22:33:44:38			
39		192.168.1.40	00:11:22:33:44:39			
40		192.168.1.41	00:11:22:33:44:40			
41		192.168.1.42	00:11:22:33:44:41			
42		192.168.1.43	00:11:22:33:44:42			
43		192.168.1.44	00:11:22:33:44:43			
44		192.168.1.45	00:11:22:33:44:44			
45		192.168.1.46	00:11:22:33:44:45			
46		192.168.1.47	00:11:22:33:44:46			
47		192.168.1.48	00:11:22:33:44:47			
48		192.168.1.49	00:11:22:33:44:48			
49		192.168.1.50	00:11:22:33:44:49			
50		192.168.1.51	00:11:22:33:44:50			
51		192.168.1.52	00:11:22:33:44:51			

# Prepare CLI rules for “massive” configuration

- Add the first line with WinBox, if you’re not sure



# Prepare CLI rules for “massive” configuration

- Check the syntax in CLI

```
Terminal
MMM MMMM MMM  III  KKK  KKK  RRRRRR   000000   TTT   III  KKK  KKK
MMM  MM  MMM  III  KKKKK  RRR  RRR  000  000   TTT   III  KKKKK
MMM      MMM  III  KKK  KKK  RRRRRR   000  000   TTT   III  KKK  KKK
MMM      MMM  III  KKK  KKK  RRR  RRR   000000   TTT   III  KKK  KKK

MikroTik RouterOS 6.34.2 (c) 1999-2015      http://www.mikrotik.com/

[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]       Completes the command/word. If the input is ambiguous,
            a second [Tab] gives possible options

/           Move up to base level
..         Move up one level
/command    Use command at the base level
[admin@MikroTik] > ip dhcp-server lease
[admin@MikroTik] /ip dhcp-server lease> export
# feb/24/2016 23:24:25 by RouterOS 6.34.2
# software id = 1VWV-4NDH
#
/ip dhcp-server lease
add address=192.168.1.2 mac-address=00:11:22:33:44:01 server=dhcp1
[admin@MikroTik] /ip dhcp-server lease> █
```



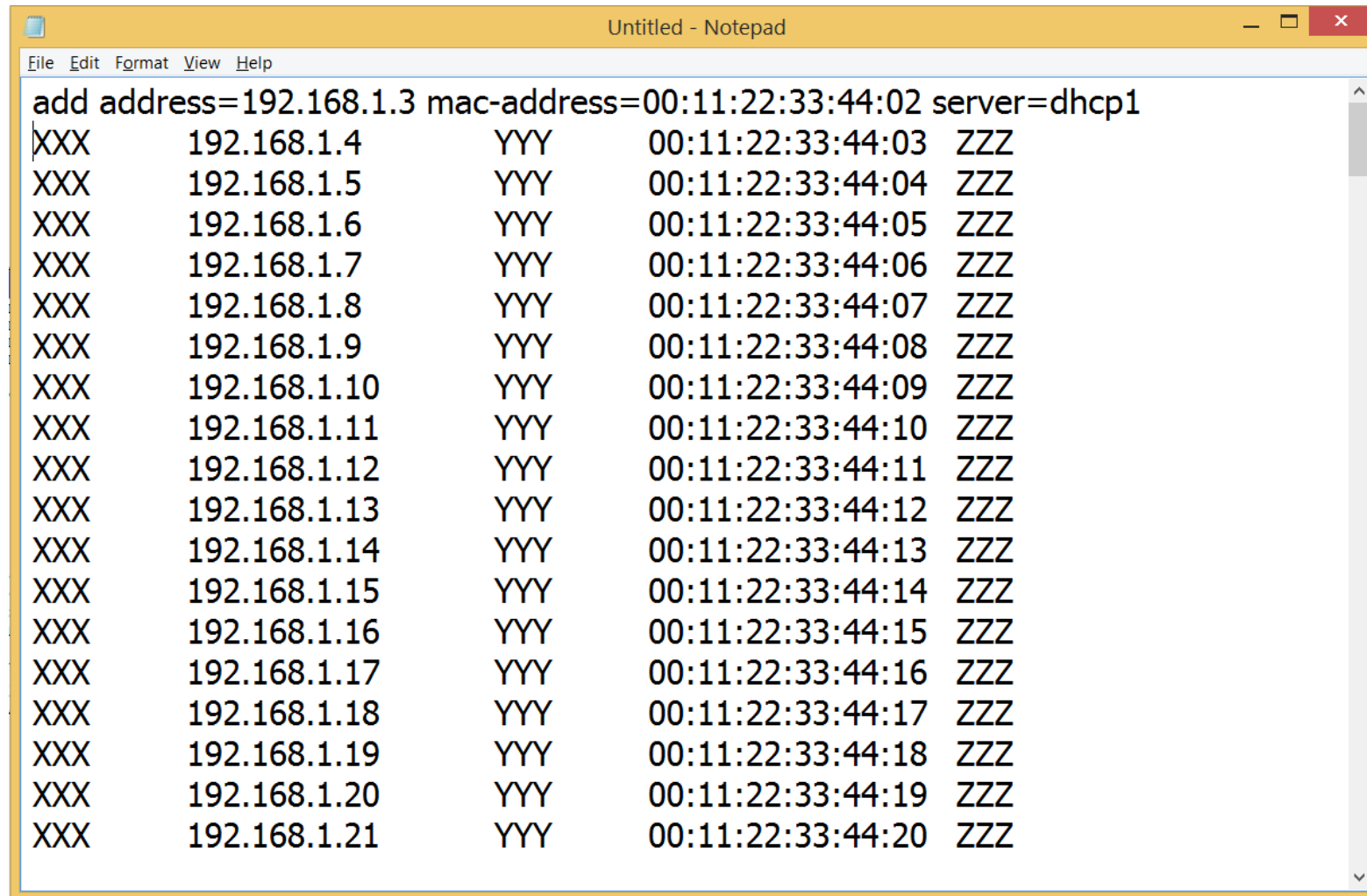
# Prepare CLI rules for “massive” configuration

- Create “dummy” columns with unique values

	A	B	C	D	E	F
37	XXX	192.168.1.38	YYY	00:11:22:33:44:37	ZZZ	
38	XXX	192.168.1.39	YYY	00:11:22:33:44:38	ZZZ	
39	XXX	192.168.1.40	YYY	00:11:22:33:44:39	ZZZ	
40	XXX	192.168.1.41	YYY	00:11:22:33:44:40	ZZZ	
41	XXX	192.168.1.42	YYY	00:11:22:33:44:41	ZZZ	
42	XXX	192.168.1.43	YYY	00:11:22:33:44:42	ZZZ	
43	XXX	192.168.1.44	YYY	00:11:22:33:44:43	ZZZ	
44	XXX	192.168.1.45	YYY	00:11:22:33:44:44	ZZZ	
45	XXX	192.168.1.46	YYY	00:11:22:33:44:45	ZZZ	
46	XXX	192.168.1.47	YYY	00:11:22:33:44:46	ZZZ	
47	XXX	192.168.1.48	YYY	00:11:22:33:44:47	ZZZ	
48	XXX	192.168.1.49	YYY	00:11:22:33:44:48	ZZZ	
49	XXX	192.168.1.50	YYY	00:11:22:33:44:49	ZZZ	
50	XXX	192.168.1.51	YYY	00:11:22:33:44:50	ZZZ	
51	XXX	192.168.1.52	YYY	00:11:22:33:44:51	ZZZ	

# Prepare CLI rules for “massive” configuration

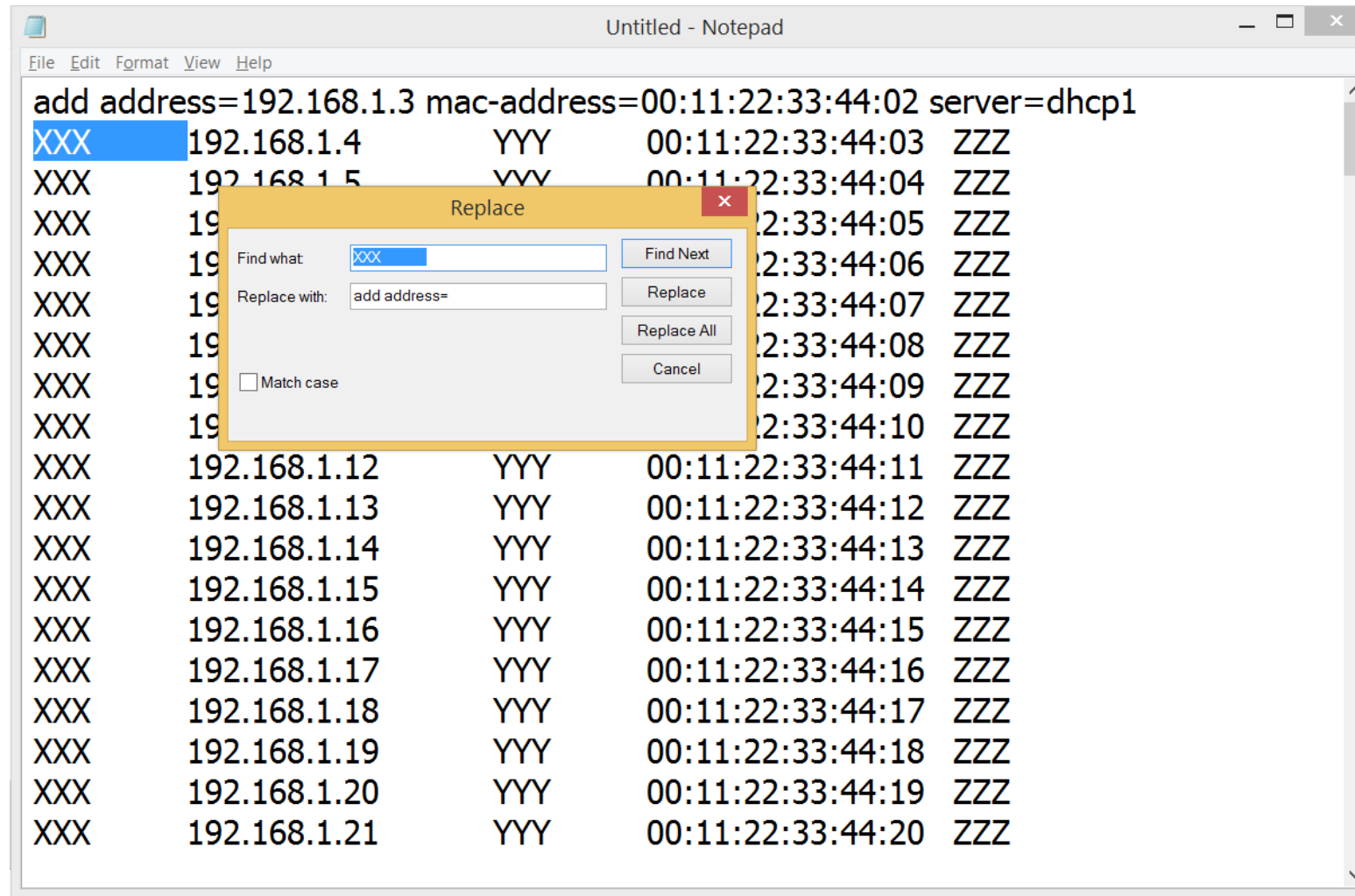
- Copy the spreadsheet to the notepad, prepare the first line



```
Untitled - Notepad
File Edit Format View Help
add address=192.168.1.3 mac-address=00:11:22:33:44:02 server=dhcp1
XXX 192.168.1.4 YYY 00:11:22:33:44:03 ZZZ
XXX 192.168.1.5 YYY 00:11:22:33:44:04 ZZZ
XXX 192.168.1.6 YYY 00:11:22:33:44:05 ZZZ
XXX 192.168.1.7 YYY 00:11:22:33:44:06 ZZZ
XXX 192.168.1.8 YYY 00:11:22:33:44:07 ZZZ
XXX 192.168.1.9 YYY 00:11:22:33:44:08 ZZZ
XXX 192.168.1.10 YYY 00:11:22:33:44:09 ZZZ
XXX 192.168.1.11 YYY 00:11:22:33:44:10 ZZZ
XXX 192.168.1.12 YYY 00:11:22:33:44:11 ZZZ
XXX 192.168.1.13 YYY 00:11:22:33:44:12 ZZZ
XXX 192.168.1.14 YYY 00:11:22:33:44:13 ZZZ
XXX 192.168.1.15 YYY 00:11:22:33:44:14 ZZZ
XXX 192.168.1.16 YYY 00:11:22:33:44:15 ZZZ
XXX 192.168.1.17 YYY 00:11:22:33:44:16 ZZZ
XXX 192.168.1.18 YYY 00:11:22:33:44:17 ZZZ
XXX 192.168.1.19 YYY 00:11:22:33:44:18 ZZZ
XXX 192.168.1.20 YYY 00:11:22:33:44:19 ZZZ
XXX 192.168.1.21 YYY 00:11:22:33:44:20 ZZZ
```

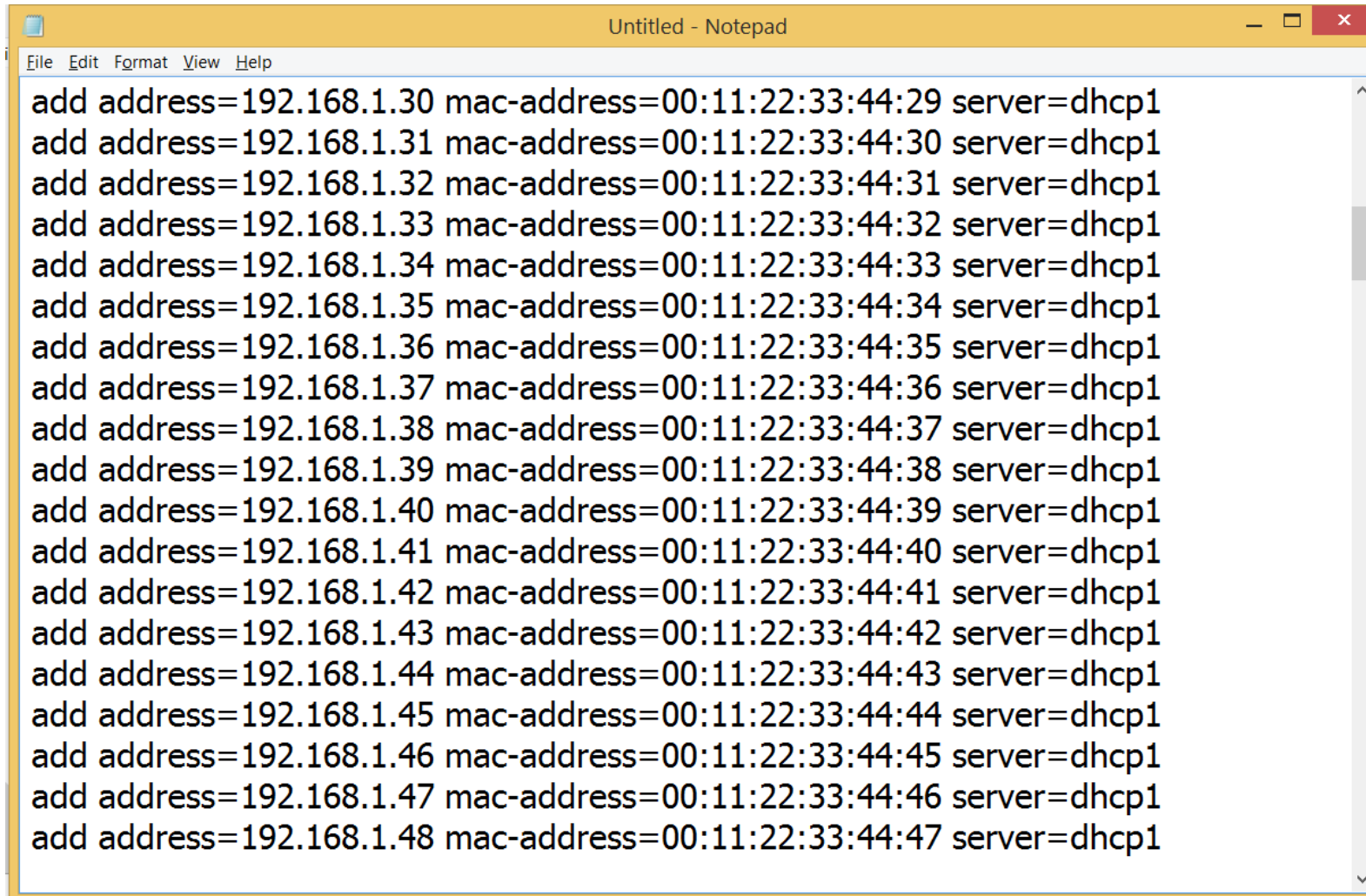
# Prepare CLI rules for “massive” configuration

- Use “Replace” function



# Prepare CLI rules for “massive” configuration

- Voila!



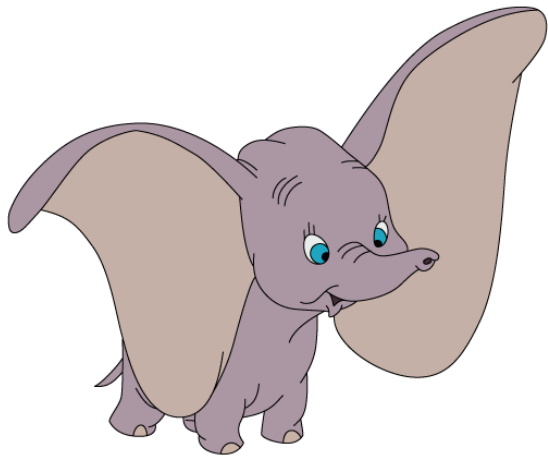
```
Untitled - Notepad
File Edit Format View Help
add address=192.168.1.30 mac-address=00:11:22:33:44:29 server=dhcp1
add address=192.168.1.31 mac-address=00:11:22:33:44:30 server=dhcp1
add address=192.168.1.32 mac-address=00:11:22:33:44:31 server=dhcp1
add address=192.168.1.33 mac-address=00:11:22:33:44:32 server=dhcp1
add address=192.168.1.34 mac-address=00:11:22:33:44:33 server=dhcp1
add address=192.168.1.35 mac-address=00:11:22:33:44:34 server=dhcp1
add address=192.168.1.36 mac-address=00:11:22:33:44:35 server=dhcp1
add address=192.168.1.37 mac-address=00:11:22:33:44:36 server=dhcp1
add address=192.168.1.38 mac-address=00:11:22:33:44:37 server=dhcp1
add address=192.168.1.39 mac-address=00:11:22:33:44:38 server=dhcp1
add address=192.168.1.40 mac-address=00:11:22:33:44:39 server=dhcp1
add address=192.168.1.41 mac-address=00:11:22:33:44:40 server=dhcp1
add address=192.168.1.42 mac-address=00:11:22:33:44:41 server=dhcp1
add address=192.168.1.43 mac-address=00:11:22:33:44:42 server=dhcp1
add address=192.168.1.44 mac-address=00:11:22:33:44:43 server=dhcp1
add address=192.168.1.45 mac-address=00:11:22:33:44:44 server=dhcp1
add address=192.168.1.46 mac-address=00:11:22:33:44:45 server=dhcp1
add address=192.168.1.47 mac-address=00:11:22:33:44:46 server=dhcp1
add address=192.168.1.48 mac-address=00:11:22:33:44:47 server=dhcp1
```

# Prepare CLI rules for “massive” configuration

The screenshot shows the MikroTik WinBox interface. The main window is titled "admin@192.168.1.1 (MikroTik) - WinBox v6.34.2 on hAP lite (smips)". The left sidebar contains a menu with items like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Make Supout.rif, Manual, New WinBox, and Exit. The main content area shows the "DHCP Server" configuration window, which is currently displaying the "Leases" tab. The table below shows a list of DHCP leases with columns for Address, MAC Address, Client ID, Server, Active Add..., Active MAC A..., Active H..., Expires After, and Status. The status for all visible leases is "waiting".

Address	MAC Address	Client ID	Server	Active Add...	Active MAC A...	Active H...	Expires After	Status
192.168.1.19	00:11:22:33:44:...		dhcp1					waiting
::: #example								
192.168.1.20	00:11:22:33:44:...		dhcp1					waiting
::: #example								
192.168.1.21	00:11:22:33:44:...		dhcp1					waiting
::: #example								
192.168.1.22	00:11:22:33:44:...		dhcp1					waiting
::: #example								
192.168.1.23	00:11:22:33:44:...		dhcp1					waiting
::: #example								
192.168.1.24	00:11:22:33:44:...		dhcp1					waiting
::: #example								
192.168.1.25	00:11:22:33:44:...		dhcp1					waiting
::: #example								
192.168.1.26	00:11:22:33:44:...		dhcp1					waiting
::: #example								
192.168.1.27	00:11:22:33:44:...		dhcp1					waiting

And now for something  
completely different



# Comment your configuration

- Adding comments is very useful!
- Questions after few years – “why the h\*ll did I put this rule here?” 😊
- Especially useful in Firewall – where it’s impossible to list all attributes

# Comment your configuration

The screenshot shows the MikroTik WinBox interface for configuring Firewall Filter Rules. The main window is titled "admin@192.168.133.140 (MikroTik) - WinBox v6.34.2 on hAP lite (smips)". The left sidebar contains navigation options like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Make Supout.rif, Manual, New WinBox, and Exit. The main area displays the Firewall configuration page with tabs for Filter Rules, NAT, Mangle, Service Ports, Connections, Address Lists, and Layer7 Protocols. A table lists four firewall rules:

#	Action	Chain	Src. Addr...	Dst. Addr...	Prot...	Src. Port	Dst. Port	In. Inte...	Out. In...	Bytes	Packets
0	drop	input			17 (...)		53	ether1		0 B	0
1	drop	input			6 (tc...)		53	ether1		0 B	0
2	drop	forward			17 (...)		53	ether1		0 B	0
3	drop	forward			6 (tc...)		53	ether1		0 B	0

A dialog box titled "Comment for Firewall Rule <53>" is open, showing a text input field with the text "Block TCP DNS from outside to LAN" and "OK" and "Cancel" buttons. The status bar at the bottom indicates "4 items (1 selected)".



# Use #hashtags to group your rules

- Having many firewall rules for specific hosts or services?
- Having many DHCP leases for specific users?
- Having many firewall address-list addresses for some users?
  
- Add hashtags in comments, like:
  - #server1, #server1, #dstarnowski, #jsmith
  
- Easy to find by [**find comment~”#hashtag”**]

# Use #hashtags to group your rules

1 ;;; Block TCP DNS from outside to router #dns  
chain=input action=drop protocol=tcp in-interface=ether1 dst-port=53  
log=no log-prefix=""  
2 ;;; Block UDP DNS from outside to LAN #dns  
chain=forward action=drop protocol=udp in-interface=ether1 dst-port=53  
log=no log-prefix=""  
3 ;;; Block TCP DNS from outside to LAN #dns  
chain=forward action=drop protocol=tcp in-interface=ether1 dst-port=53  
log=no log-prefix=""  
4 ;;; Block SNMP from outside to router  
chain=input action=drop protocol=udp in-interface=ether1 dst-port=161,162  
log=no log-prefix=""  
5 ;;; Block SNMP from outside to LAN  
chain=forward action=drop protocol=udp in-interface=ether1  
dst-port=161,162 log=no log-prefix=""  
[admin@MikroTik] >"/>

The screenshot shows the MikroTik WinBox interface for configuring Firewall Filter Rules. The terminal window displays the output of the command `/ip firewall filter print`, showing five rules with their respective actions and configurations. The rules are numbered 0 to 5. The output is as follows:

```
[admin@MikroTik] > /ip firewall filter print
Flags: X - disabled, I - invalid, D - dynamic
0 ;;; Block UDP DNS from outside to router #dns
chain=input action=drop protocol=udp in-interface=ether1 dst-port=53
log=no log-prefix=""
1 ;;; Block TCP DNS from outside to router #dns
chain=input action=drop protocol=tcp in-interface=ether1 dst-port=53
log=no log-prefix=""
2 ;;; Block UDP DNS from outside to LAN #dns
chain=forward action=drop protocol=udp in-interface=ether1 dst-port=53
log=no log-prefix=""
3 ;;; Block TCP DNS from outside to LAN #dns
chain=forward action=drop protocol=tcp in-interface=ether1 dst-port=53
log=no log-prefix=""
4 ;;; Block SNMP from outside to router
chain=input action=drop protocol=udp in-interface=ether1 dst-port=161,162
log=no log-prefix=""
5 ;;; Block SNMP from outside to LAN
chain=forward action=drop protocol=udp in-interface=ether1
dst-port=161,162 log=no log-prefix=""
[admin@MikroTik] >
```

# Use #hashtags to group your rules

The screenshot shows the MikroTik WinBox interface. The main window displays the Firewall Filter Rules configuration. A terminal window is open, showing the command `/ip firewall filter print from=[find comment-\"#dns\"]` and its output. The output lists six firewall rules, each with a comment starting with `#dns`.

#	Action	Comment
0	Block UDP	Block UDP DNS from outside to router #dns
1	Block TCP	Block TCP DNS from outside to router #dns
2	Block UDP	Block UDP DNS from outside to LAN #dns
3	Block TCP	Block TCP DNS from outside to LAN #dns
4	Block UDP	Block UDP DNS from outside to LAN #dns
5	Block TCP	Block TCP DNS from outside to LAN #dns

# Use #hashtags to group your rules

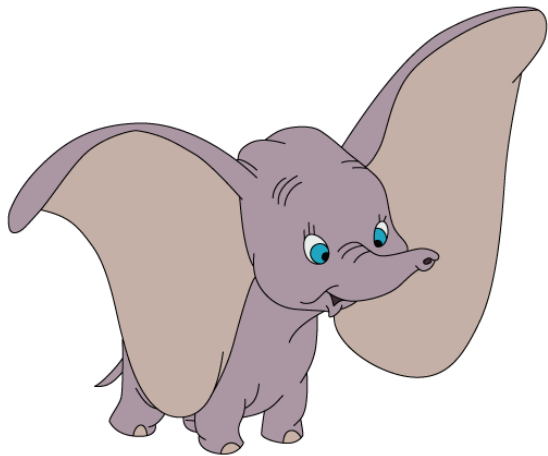
The screenshot shows the Mikrotik WinBox interface with the Firewall Filter Rules configuration window open. The interface includes a sidebar with navigation options like Quick Set, CAPsMAN, Interfaces, and System. The main window displays a table of firewall rules with columns for #, Action, and Chain. A terminal window is overlaid on top, showing the configuration of five rules, each with a comment starting with #dns. The terminal also shows the command `/ip firewall filter disable [find comment~"#dns"]` being executed.

#	Action	Chain
0	X drop	input
1	X drop	input
2	X drop	forward
3	X drop	forward
4	X drop	input
5	X drop	forward

```
Flags: X - disabled, I - invalid, D - dynamic
0    ;;; Block UDP DNS from outside to router #dns
    chain=input action=drop protocol=udp in-interface=ether1 dst-port=53
    log=no log-prefix=""
1    ;;; Block TCP DNS from outside to router #dns
    chain=input action=drop protocol=tcp in-interface=ether1 dst-port=53
    log=no log-prefix=""
2    ;;; Block UDP DNS from outside to LAN #dns
    chain=forward action=drop protocol=udp in-interface=ether1 dst-port=53
    log=no log-prefix=""
3    ;;; Block TCP DNS from outside to LAN #dns
    chain=forward action=drop protocol=tcp in-interface=ether1 dst-port=53
    log=no log-prefix=""
4    ;;; Block SNMP from outside to router #dns
5    ;;; Block SNMP from outside to LAN #dns
```

```
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] >
[admin@MikroTik] > /ip firewall filter disable [find comment~"#dns"]
[admin@MikroTik] >
```

And now for something  
completely different



# Remember you can write your scripts

- Scripts can be useful to speed things up
- My example – home MikroTik with public IP address
- Only SSH (on a non-standard port) open to the world
- Some servers inside, a network disk with FTP, etc. – with dst-nat rules (port forwarding) only for trusted IP addresses from address list
- One simple script to add my current IP address

# Remember you can write your scripts

The image shows two windows from the Mikrotik WinBox interface. The left window, titled "Script List", displays a table with the following data:

Name	Owner	Last Time Started	Run Co...
logmein	logmein		0

The right window, titled "Script <logmein>", shows the configuration for the selected script:

- Name: logmein
- Owner: logmein
- Policy:  ftp,  read,  policy,  password,  sensitive,  reboot,  write,  test,  sniff
- Last Time Started: (empty)
- Run Count: 0
- Source: 

```
/ip firewall address-list add list=allowed timeout=6h address=[/user active get [find name=logmein] address]]
```

# Remember you can write your scripts

- To access my local servers, I log in via SSH with username **logme**
- I run the script: **/system script run logmein**
- The script does the following:

```
/ip firewall address-list add  
list=allowed  
timeout=6h  
address=[/user active get [find name=logme] address]]
```

- My IP address is added to the list for 6 hours
- Of course – I can also add a “logmeout” script to delete it earlier



# SNMP – I want to see everything!

- Only some values can be monitored with SNMP
- All values can be monitored with CLI, WinBox, API...
- But I don't want my NMS to open NNNN TCP connections to my NNNN MikroTik routers every minute, I want SNMP!
- Let's take an example – hw\_frames in wireless connection

# SNMP – I want to see everything!

```
Terminal
[Tab]          Completes the command/word. If the input is ambiguous,
               a second [Tab] gives possible options

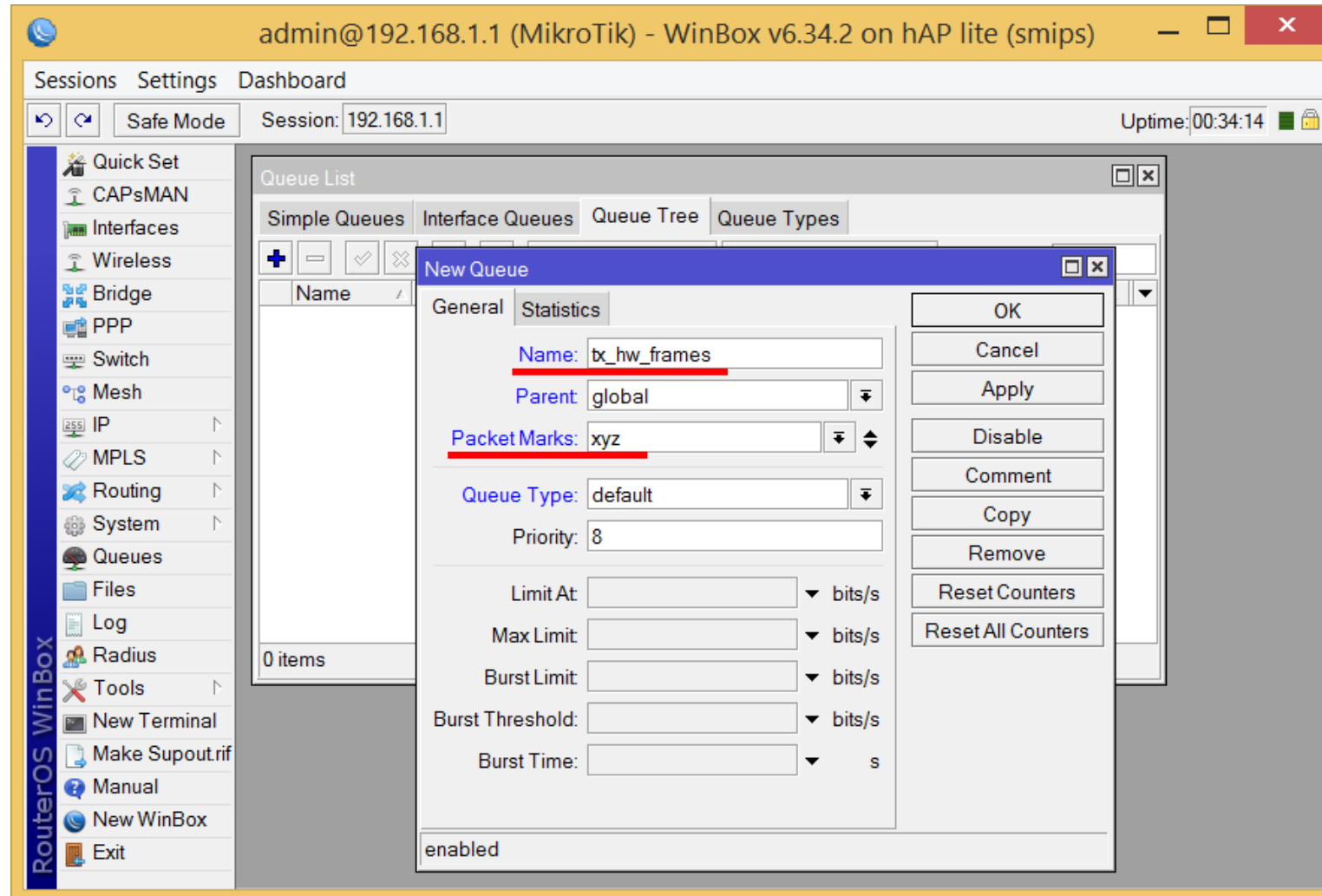
/             Move up to base level
..           Move up one level
/command     Use command at the base level
[admin@MikroTik] > interface wireless registration-table
[admin@MikroTik] /interface wireless registration-table> print stats
 0 interface=wlan1 mac-address=48:51:B7:C0:C3:E9 ap=no wds=no bridge=no
  rx-rate="150Mbps-40MHz/1S/SIG" tx-rate="135Mbps-40MHz/1S" packets=49011,32901
 bytes=53740690,6247165 frames=45063,32913 frame-bytes=53906360,6051344 hw-frames=57888,33809
 hw-frame-bytes=70539749,7493037 tx-frames-timed-out=0 uptime=5m52s last-activity=0ms
 signal-strength=-48dBm@HT40-7 signal-to-noise=59dB signal-strength-ch0=-48dBm
 strength-at-rates=-45dBm@1Mbps 4m43s730ms,-50dBm@2Mbps 18m16s400ms,-44dBm@5.5Mbps 20m3s550ms,-
 42dBm@6Mbps 1s,-47dBm@9Mbps 19m56s920ms,-50dBm@12Mbps 27m42s870ms,-51dBm@18Mbps
 27m24s700ms,-53dBm@24Mbps 27m12s400ms,-45dBm@36Mbps 20m9s470ms,-44dBm@48Mbps
 2m15s710ms,-46dBm@54Mbps 5m46s220ms,-58dBm@HT40-1 27m27s20ms,-48dBm@HT40-2
 19m56s910ms,-47dBm@HT40-3 19m56s940ms,-47dBm@HT40-4 5m44s460ms,-45dBm@HT40-5
 5s720ms,-46dBm@HT40-6 4s930ms,-48dBm@HT40-7 0ms
 tx-ccq=81% p-throughput=94472 distance=3 last-ip=192.168.1.254 802.1x-port-enabled=yes
 authentication-type=wpa2-psk encryption=aes-ccm group-encryption=aes-ccm
 management-protection=no wmm-enabled=yes
 tx-rate-set="CCK:1-11 OFDM:6-54 BW:1x-2x SGI:1x-2x HT:0-7"
[admin@MikroTik] /interface wireless registration-table>
```

# SNMP – I want to see everything!

```
Terminal
/          Move up to base level
..        Move up one level
/command  Use command at the base level
[admin@MikroTik] > interface wireless registration-table
[admin@MikroTik] /interface wireless registration-table> print oid
0 signal-strength=.1.3.6.1.4.1.14988.1.1.1.2.1.3.72.81.183.192.195.233.5
  tx-signal-strength=.1.3.6.1.4.1.14988.1.1.1.2.1.19.72.81.183.192.195.233.5
  tx-bytes=.1.3.6.1.4.1.14988.1.1.1.2.1.4.72.81.183.192.195.233.5
  rx-bytes=.1.3.6.1.4.1.14988.1.1.1.2.1.5.72.81.183.192.195.233.5
  tx-packets=.1.3.6.1.4.1.14988.1.1.1.2.1.6.72.81.183.192.195.233.5
  rx-packets=.1.3.6.1.4.1.14988.1.1.1.2.1.7.72.81.183.192.195.233.5
  tx-rate=.1.3.6.1.4.1.14988.1.1.1.2.1.8.72.81.183.192.195.233.5
  rx-rate=.1.3.6.1.4.1.14988.1.1.1.2.1.9.72.81.183.192.195.233.5
  routers-version=.1.3.6.1.4.1.14988.1.1.1.2.1.10.72.81.183.192.195.233.5
  uptime=.1.3.6.1.4.1.14988.1.1.1.2.1.11.72.81.183.192.195.233.5
  signal-to-noise=.1.3.6.1.4.1.14988.1.1.1.2.1.12.72.81.183.192.195.233.5
  tx-signal-strength-ch0=.1.3.6.1.4.1.14988.1.1.1.2.1.13.72.81.183.192.195.233.5
  signal-strength-ch0=.1.3.6.1.4.1.14988.1.1.1.2.1.14.72.81.183.192.195.233.5
  tx-signal-strength-ch1=.1.3.6.1.4.1.14988.1.1.1.2.1.15.72.81.183.192.195.233.5
  signal-strength-ch1=.1.3.6.1.4.1.14988.1.1.1.2.1.16.72.81.183.192.195.233.5
  tx-signal-strength-ch2=.1.3.6.1.4.1.14988.1.1.1.2.1.17.72.81.183.192.195.233.5
  signal-strength-ch2=.1.3.6.1.4.1.14988.1.1.1.2.1.18.72.81.183.192.195.233.5
[admin@MikroTik] /interface wireless registration-table>
```

# SNMP – I want to see everything!

- Use **/queue tree** and some “dummy” entries!



# SNMP – I want to see everything!

```
Terminal
MMM MM MMM III KKKKK RRR RRR OOO OOO TTT III KKKKK
MMM   MMM III KKK KKK RRRRRR OOO OOO TTT III KKK KKK
MMM   MMM III KKK KKK RRR RRR OOOOOO TTT III KKK KKK

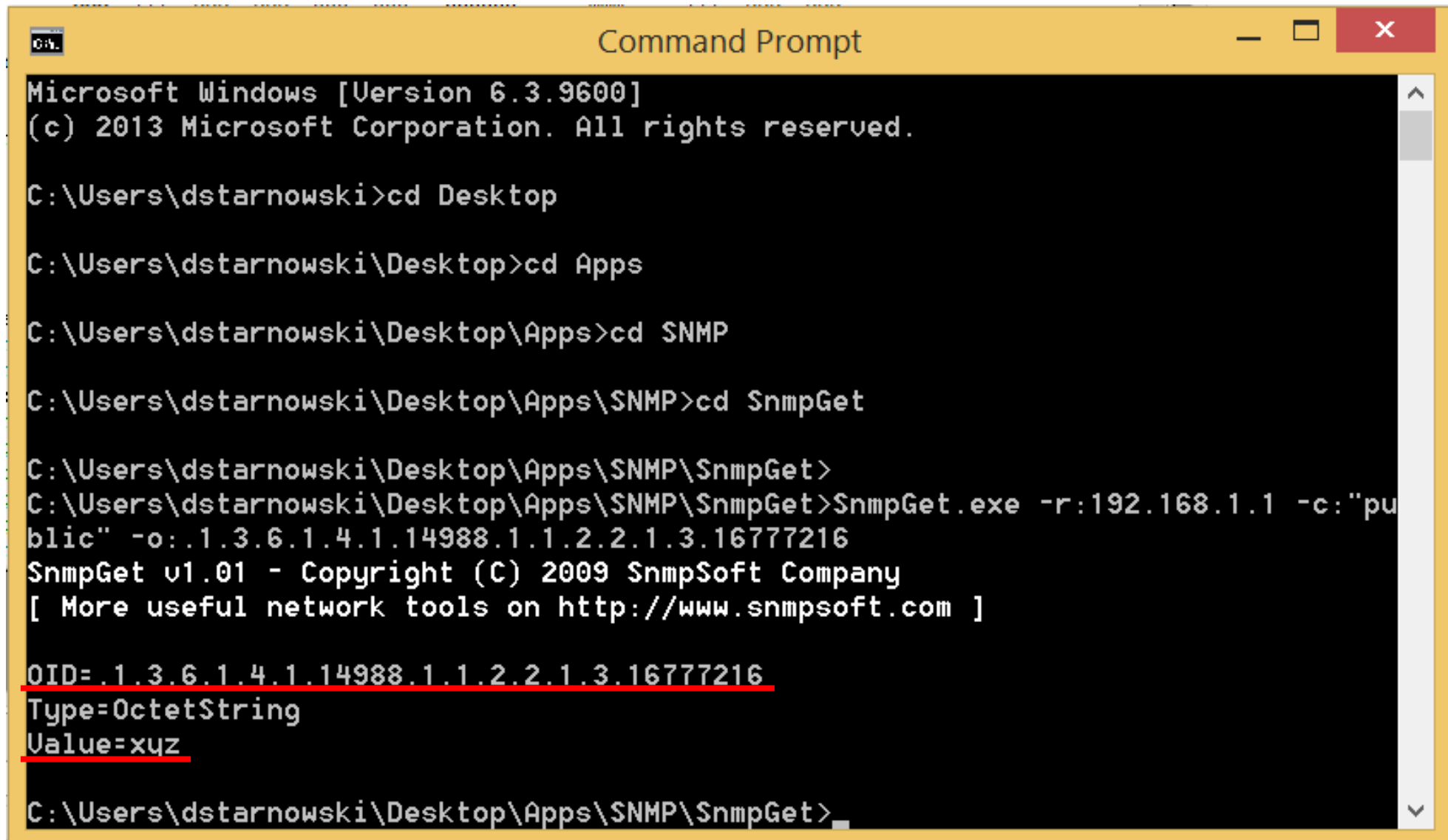
MikroTik RouterOS 6.34.2 (c) 1999-2015      http://www.mikrotik.com/

[?]          Gives the list of available commands
command [?]  Gives help on the command and list of arguments

[Tab]       Completes the command/word. If the input is ambiguous,
            a second [Tab] gives possible options

/           Move up to base level
..         Move up one level
/command   Use command at the base level
[admin@MikroTik] > queue tree
[admin@MikroTik] /queue tree> print oid
Flags: X - disabled, I - invalid
 0  name=.1.3.6.1.4.1.14988.1.1.2.2.1.2.16777216
    packet-mark=.1.3.6.1.4.1.14988.1.1.2.2.1.3.16777216
    bytes=.1.3.6.1.4.1.14988.1.1.2.2.1.7.16777216
    packets=.1.3.6.1.4.1.14988.1.1.2.2.1.6.16777216
    queues=.1.3.6.1.4.1.14988.1.1.2.2.1.8.16777216
[admin@MikroTik] /queue tree> █
```

# SNMP – I want to see everything!



```
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\dstarnowski>cd Desktop

C:\Users\dstarnowski\Desktop>cd Apps

C:\Users\dstarnowski\Desktop\Apps>cd SNMP

C:\Users\dstarnowski\Desktop\Apps\SNMP>cd SnmpGet

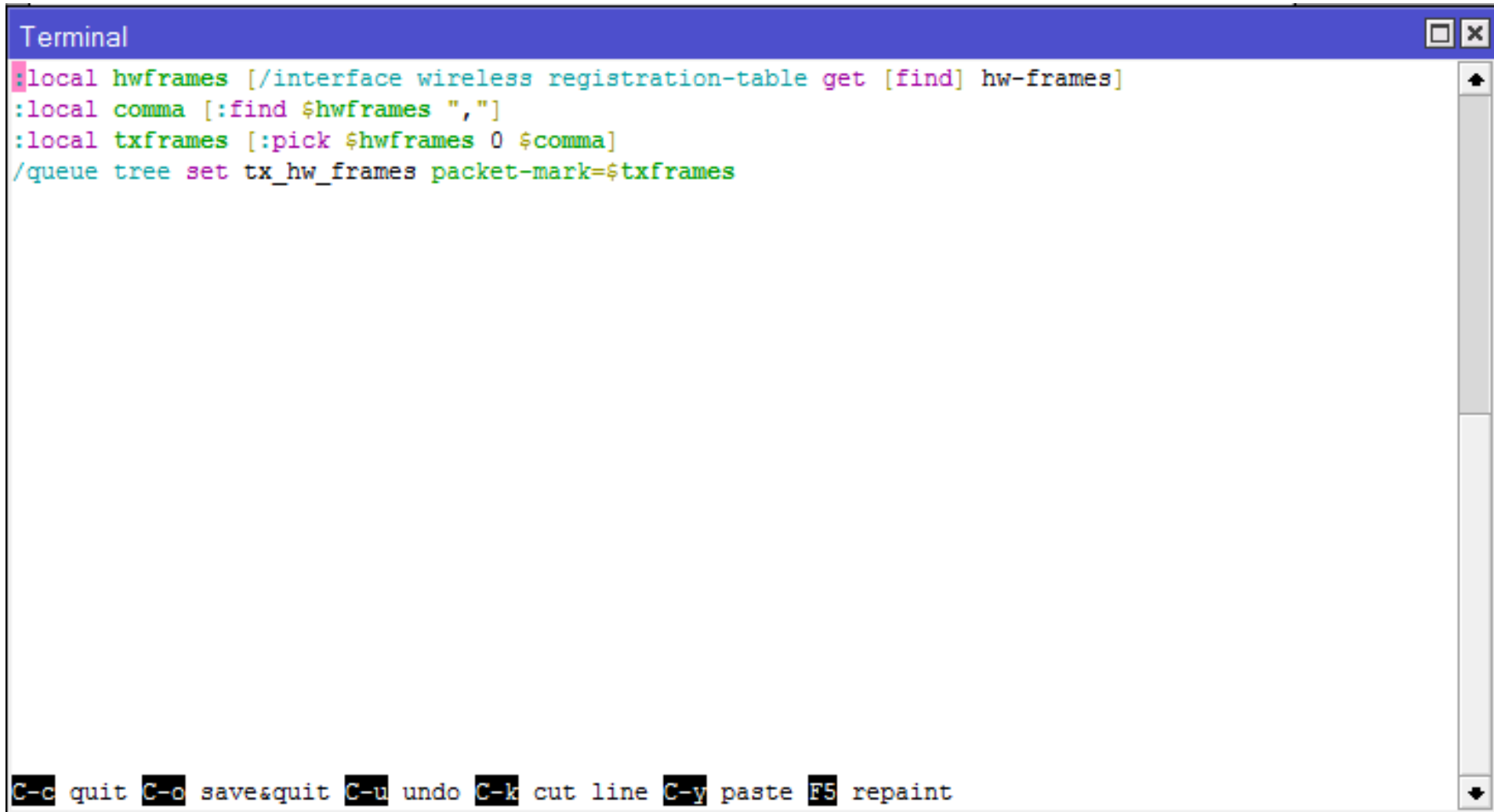
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>SnmpGet.exe -r:192.168.1.1 -c:"public" -o:.1.3.6.1.4.1.14988.1.1.2.2.1.3.16777216
SnmpGet v1.01 - Copyright (C) 2009 SnmpSoft Company
[ More useful network tools on http://www.snmpsoft.com ]

OID=.1.3.6.1.4.1.14988.1.1.2.2.1.3.16777216
Type=OctetString
Value=xuz

C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
```

# SNMP – I want to see everything!

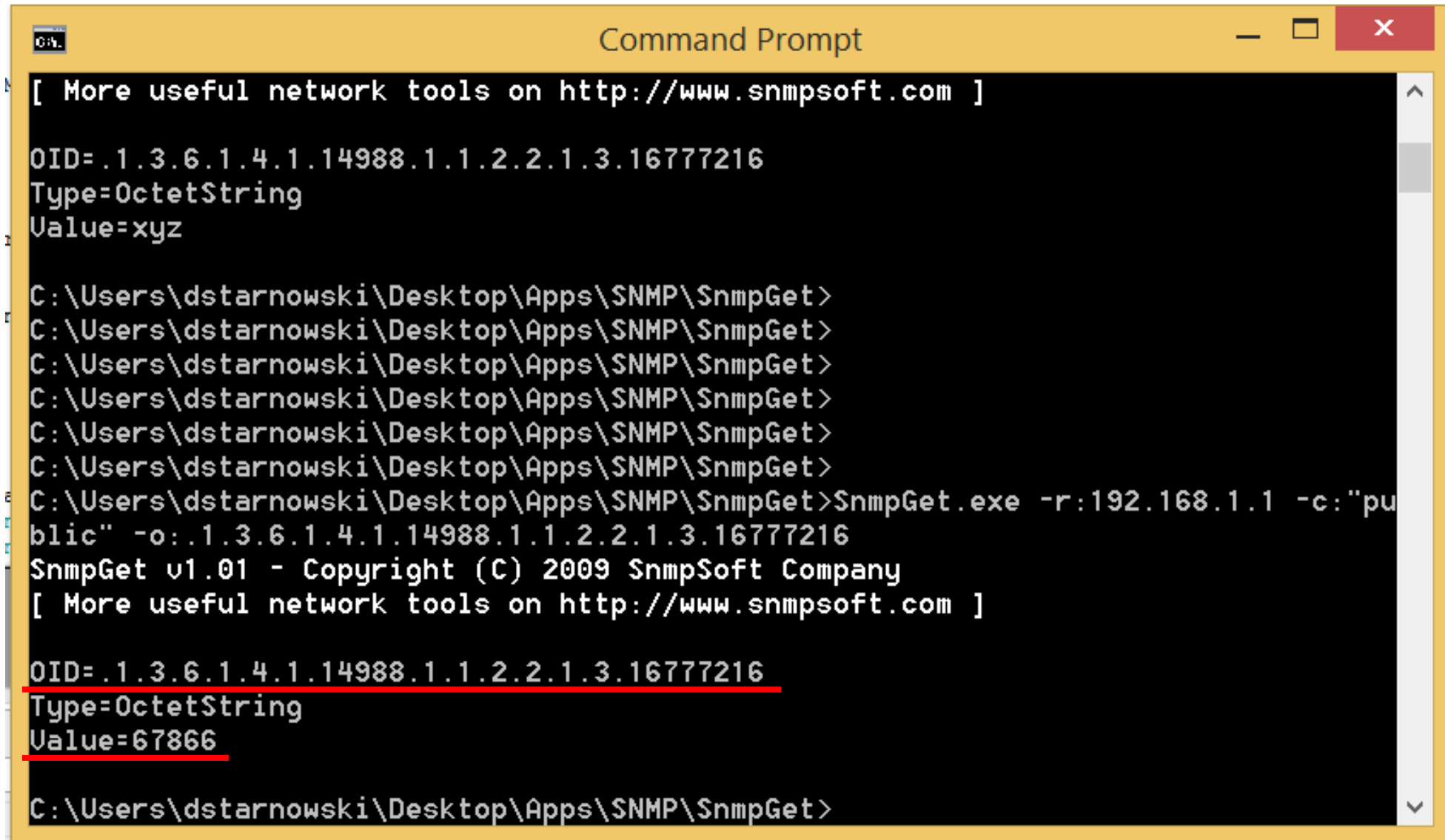
- Now let's create a script to put hw\_frames value to packet mark 😊



```
Terminal
:local hwframes [/interface wireless registration-table get [find] hw-frames]
:local comma [:find $hwframes ","]
:local txframes [:pick $hwframes 0 $comma]
/queue tree set tx_hw_frames packet-mark=$txframes

C-c quit C-o saves&quit C-u undo C-k cut line C-y paste F5 repaint
```

# SNMP – I want to see everything!



```
Command Prompt
[ More useful network tools on http://www.snmpsoft.com ]
OID= .1.3.6.1.4.1.14988.1.1.2.2.1.3.16777216
Type=OctetString
Value=xyz

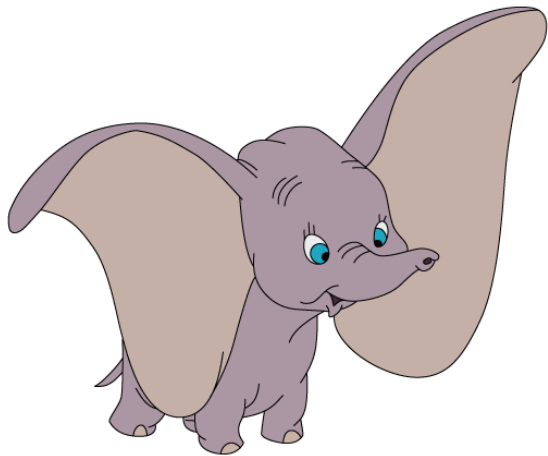
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>SnmpGet.exe -r:192.168.1.1 -c:"public" -o:.1.3.6.1.4.1.14988.1.1.2.2.1.3.16777216
SnmpGet v1.01 - Copyright (C) 2009 SnmpSoft Company
[ More useful network tools on http://www.snmpsoft.com ]

OID= .1.3.6.1.4.1.14988.1.1.2.2.1.3.16777216
Type=OctetString
Value=67866

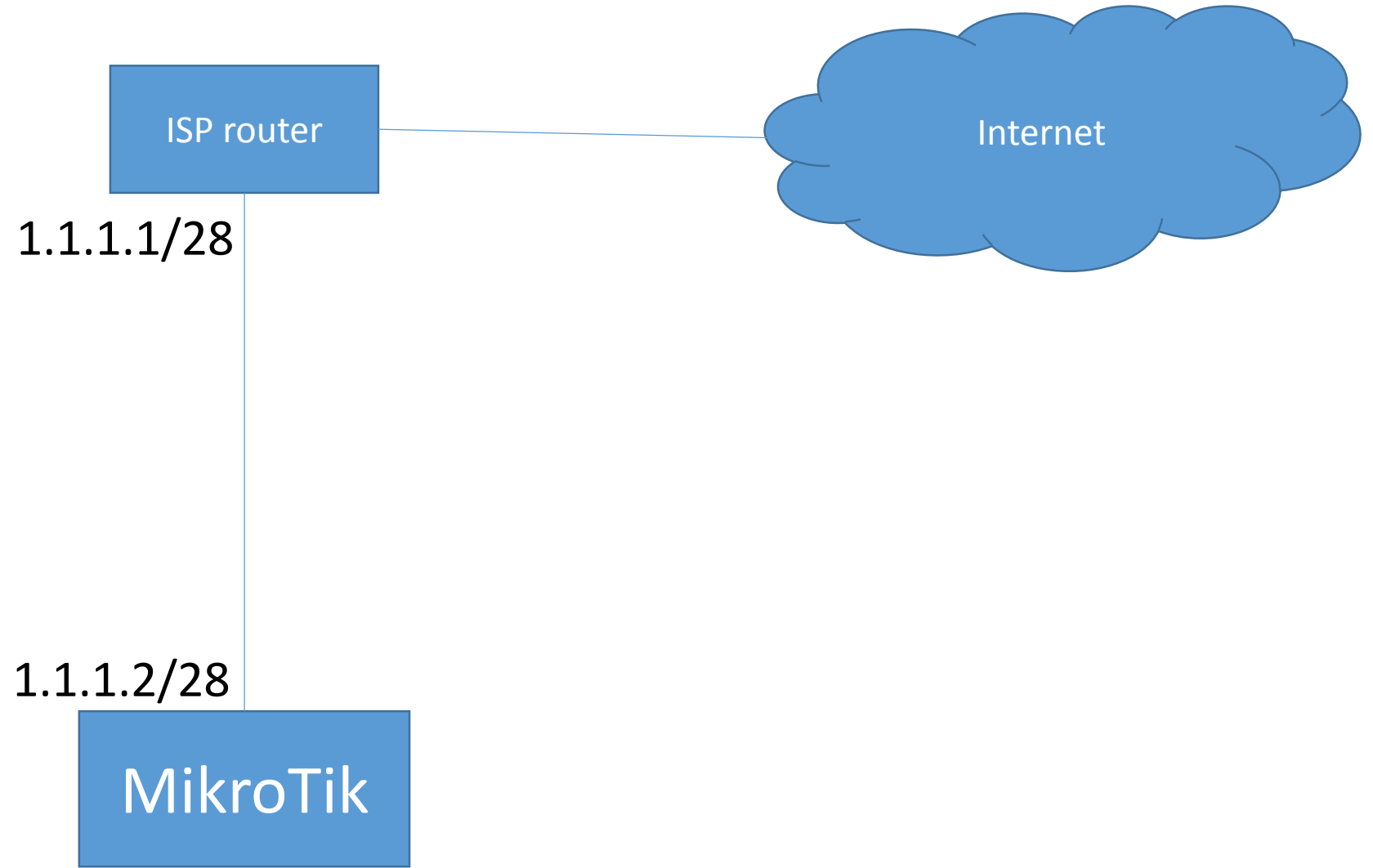
C:\Users\dstarnowski\Desktop\Apps\SNMP\SnmpGet>
```



And now for something  
completely different



# IP and ARP – short introduction



# IP and ARP – short introduction

The screenshot shows the MikroTik WinBox interface. The title bar reads "admin@4C:5E:0C:08:0D:30 (MikroTik) - WinBox v6.34.2 on hAP lite (smips)". The main menu includes "Sessions", "Settings", and "Dashboard". The session information shows "Safe Mode", "Session: 4C:5E:0C:08:0D:30", and "Uptime: 01:11:51".

The left sidebar contains the following menu items: Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Make Supoutrif, Manual, New WinBox, and Exit.

The main content area displays two windows:

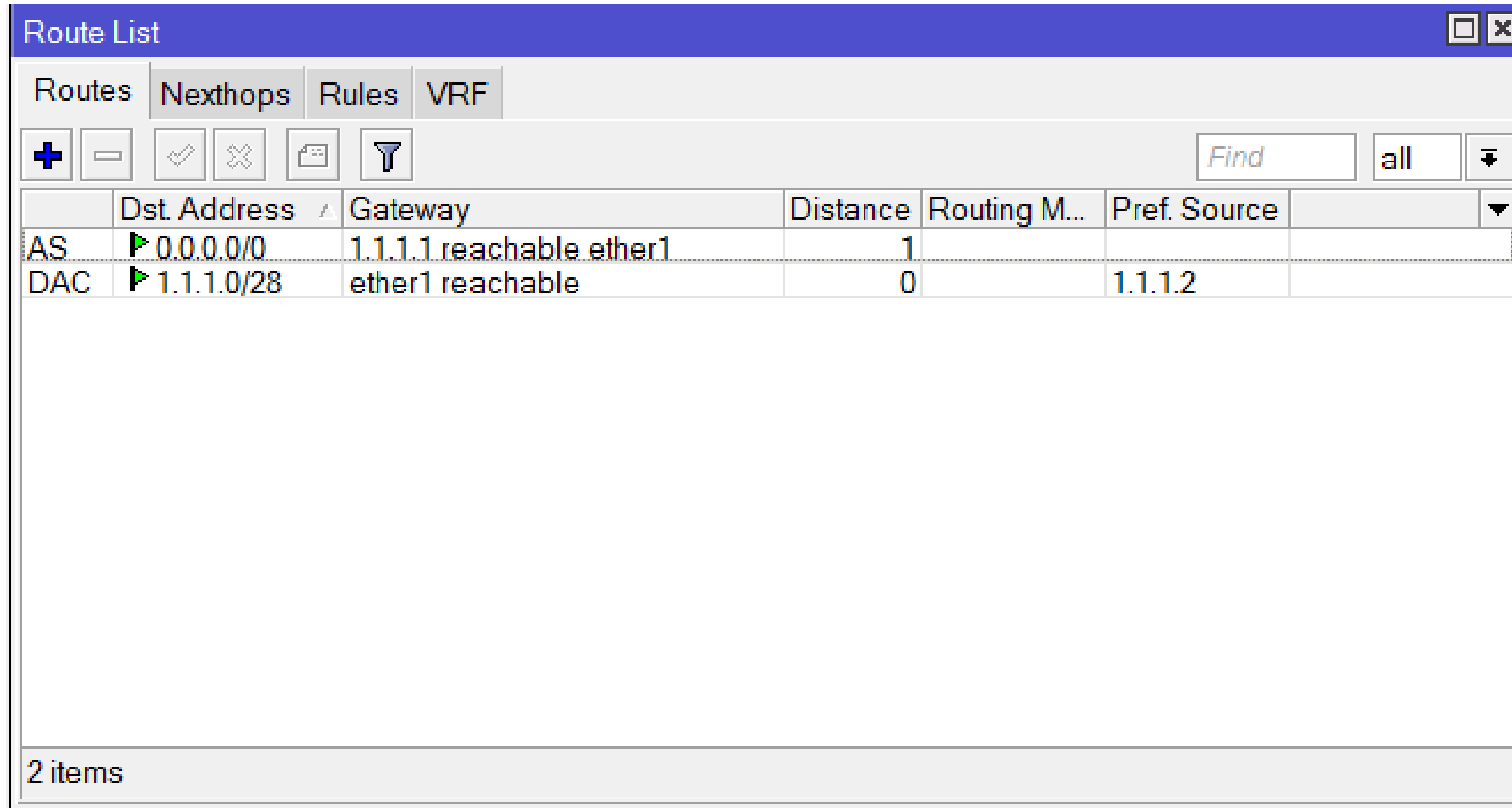
- Address List:** A table with columns "Address", "Network", and "Interface". It contains one entry: 1.1.1.2/28 on network 1.1.1.0 and interface ether1.
- Route List:** A window with tabs "Routes", "Nexthops", "Rules", and "VRF". The "Routes" tab is active, showing a table with columns "Dst Address", "Gateway", "Distance", "Routing M...", and "Pref. Source". It contains one entry: DAC, 1.1.1.0/28, ether1 reachable, 0, 1.1.1.2.

The status bar at the bottom of the Route List window indicates "1 item".

# IP and ARP – short introduction

- We configure IP address 1.1.1.2/28 on ether1 interface
- This means three things:
  - 1. The address 1.1.1.2 is one of our router's IP addresses
  - 2. The network on ether1 is 1.1.1.0/28
  - 3. Packets going to this network, originated on our router, will have source IP 1.1.1.2

# IP and ARP – short introduction



The screenshot shows the 'Route List' window in Mikrotik WinBox. The window has a blue title bar and a toolbar with icons for adding, deleting, and filtering routes. Below the toolbar is a table with columns for 'Dst. Address', 'Gateway', 'Distance', 'Routing M...', and 'Pref. Source'. Two routes are listed: 'AS' with destination '0.0.0.0/0' and gateway '1.1.1.1 reachable ether1', and 'DAC' with destination '1.1.1.0/28' and gateway 'ether1 reachable'. The 'DAC' route has a preference source of '1.1.1.2'. The status bar at the bottom indicates '2 items'.

	Dst. Address	Gateway	Distance	Routing M...	Pref. Source
AS	0.0.0.0/0	1.1.1.1 reachable ether1	1		
DAC	1.1.1.0/28	ether1 reachable	0		1.1.1.2

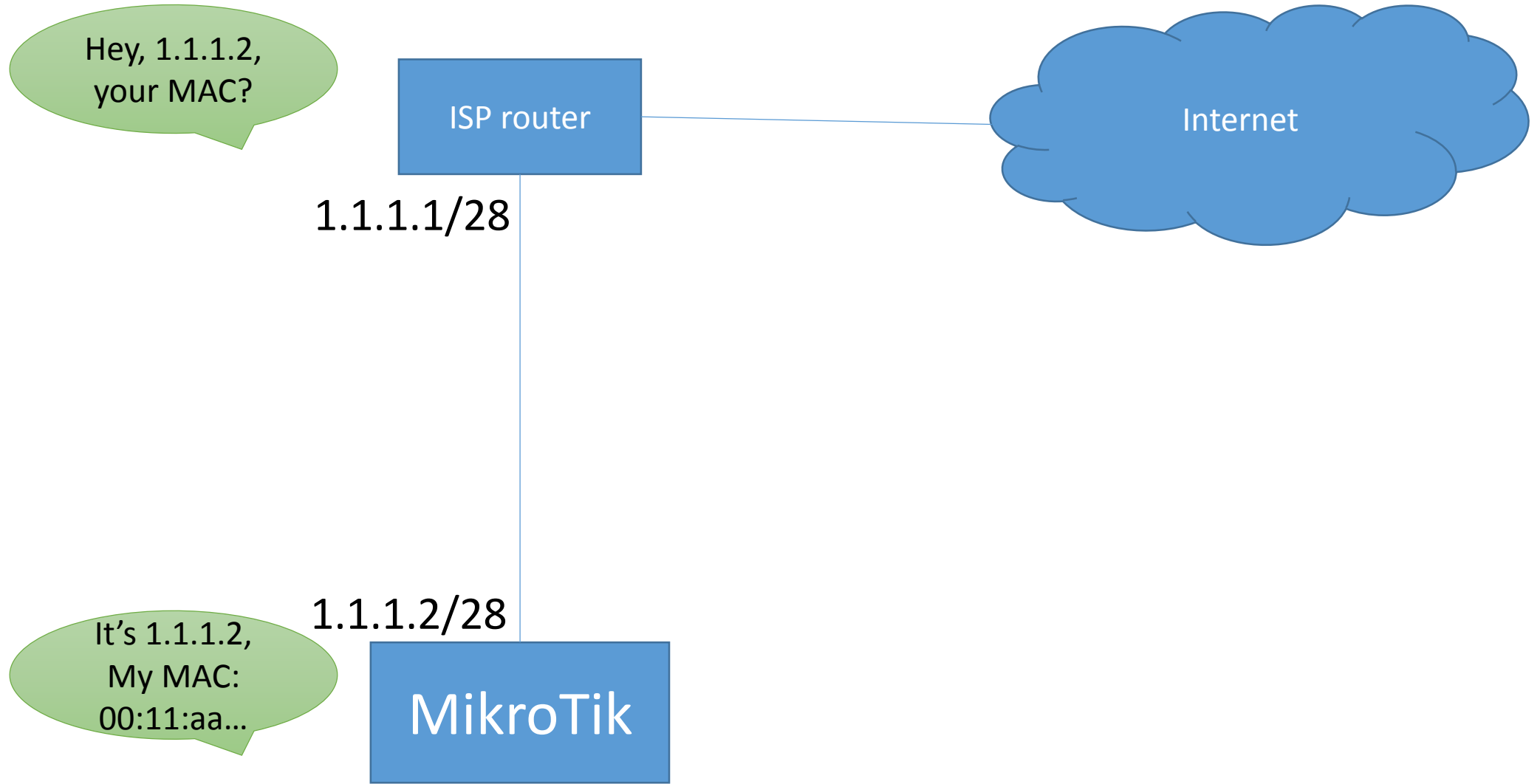
# IP and ARP – short introduction

- We add 1.1.1.1 as our default gateway (static route to 0.0.0.0/0)
- We want to send a packet to 8.8.8.8
- MikroTik checks route to 8.8.8.8 – it fits 0.0.0.0/0, so it's via 1.1.1.1
- MikroTik checks route to 1.1.1.1 – it fits 1.1.1.0/28, so it's on ether1
- MikroTik checks 1.1.1.1's MAC address with ARP request
- MikroTik sends the packet to:
  - Destination IP: 8.8.8.8
  - Destination MAC: MAC of 1.1.1.1

# IP and ARP – short introduction

- The provider's router (1.1.1.1) does the same.
- When a packet comes to 1.1.1.2, it looks for it in routing table
- It's directly connected (1.1.1.0/28) on its ethernet interface
- It asks for MAC address of 1.1.1.2 using ARP request
- It sends packet to 1.1.1.2 using the MAC address it got

# IP and ARP – short introduction

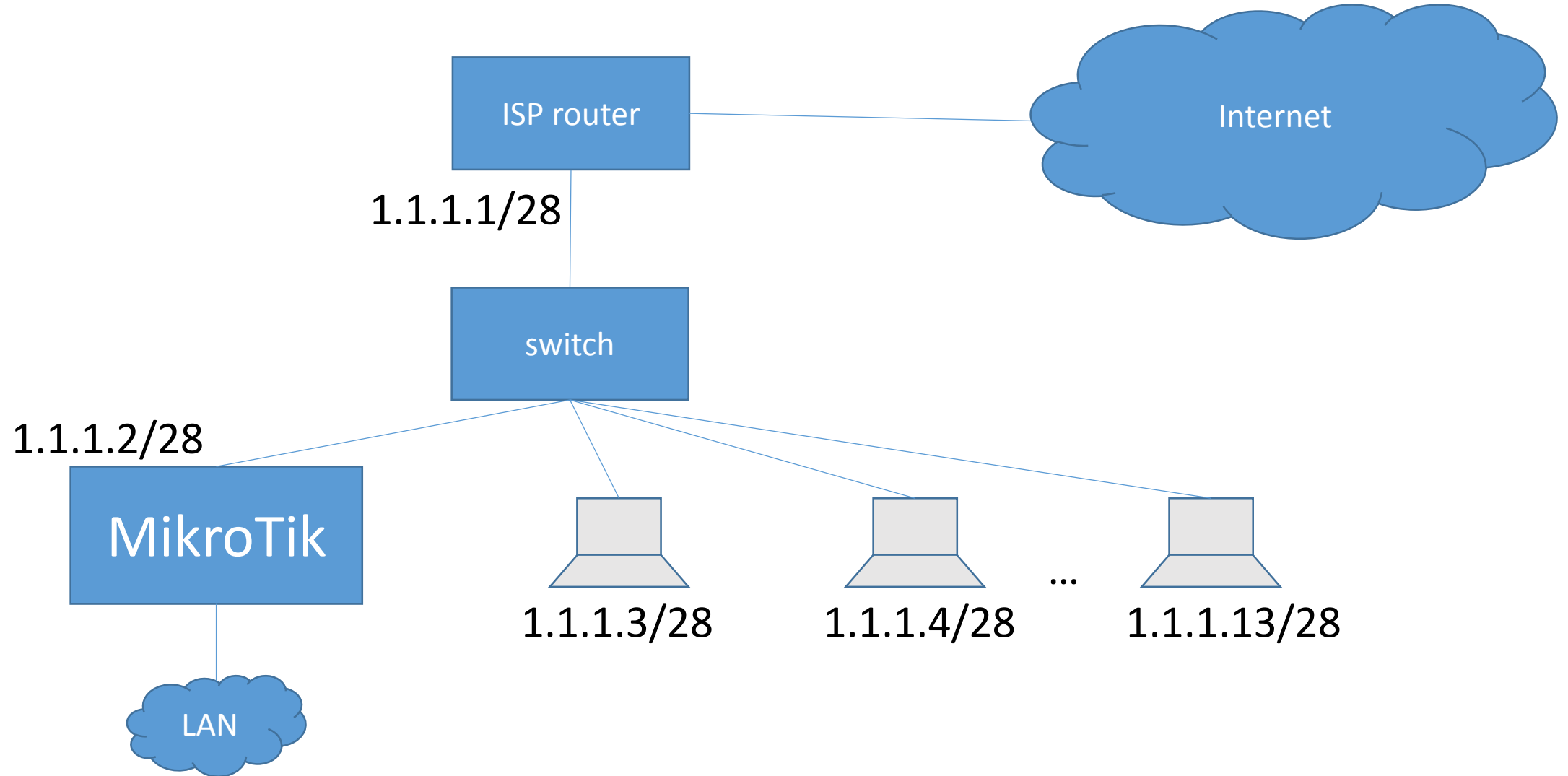




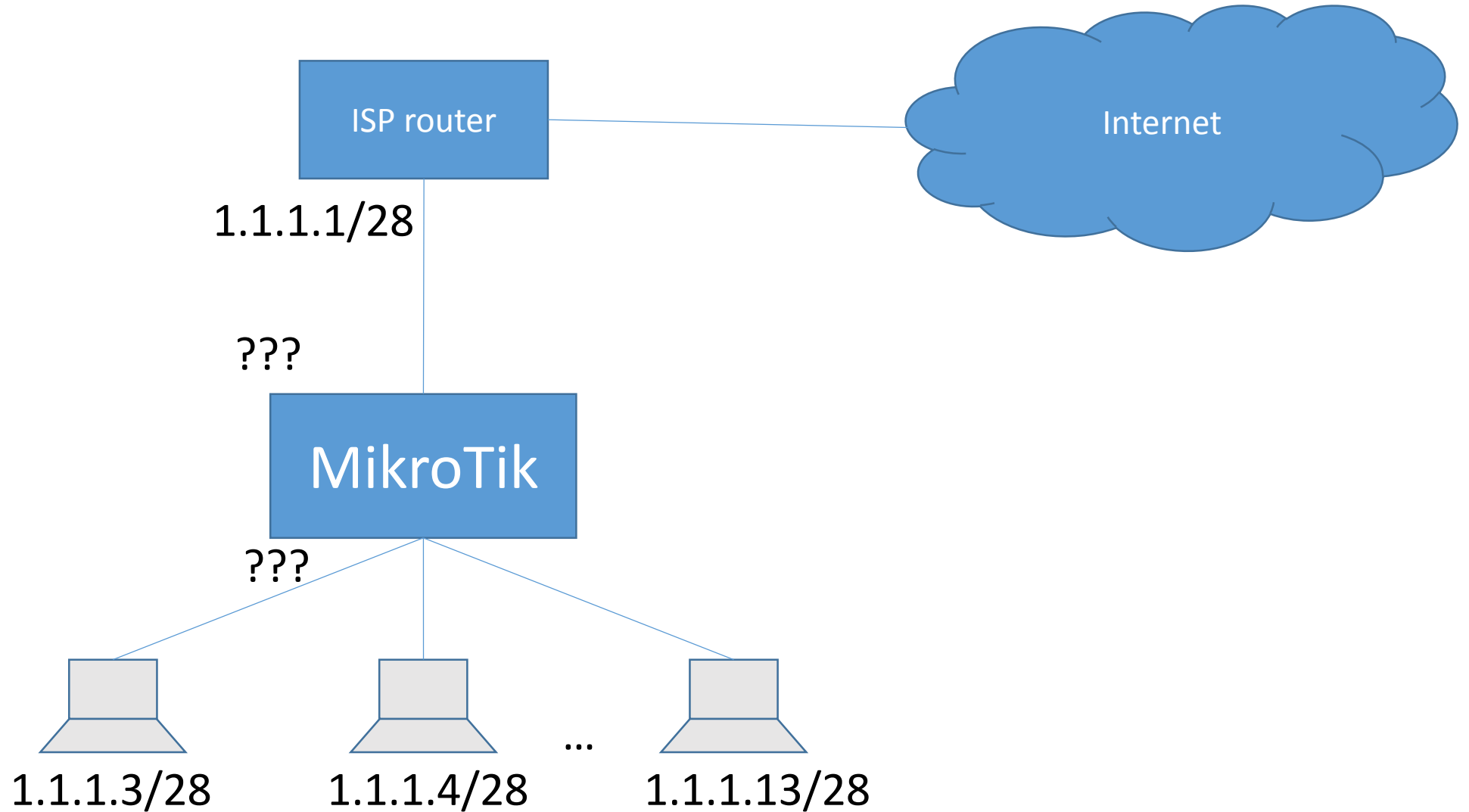
# Problem 1 – IP pool from provider

- ISP gives us an IP pool 1.1.1.0/28, with 1.1.1.1 being provider's router
  - We can use any IP between .2 and .14
  - It gives us 13 “usable” IP addresses
- 
- Only one problem – the IP addresses are in one LAN

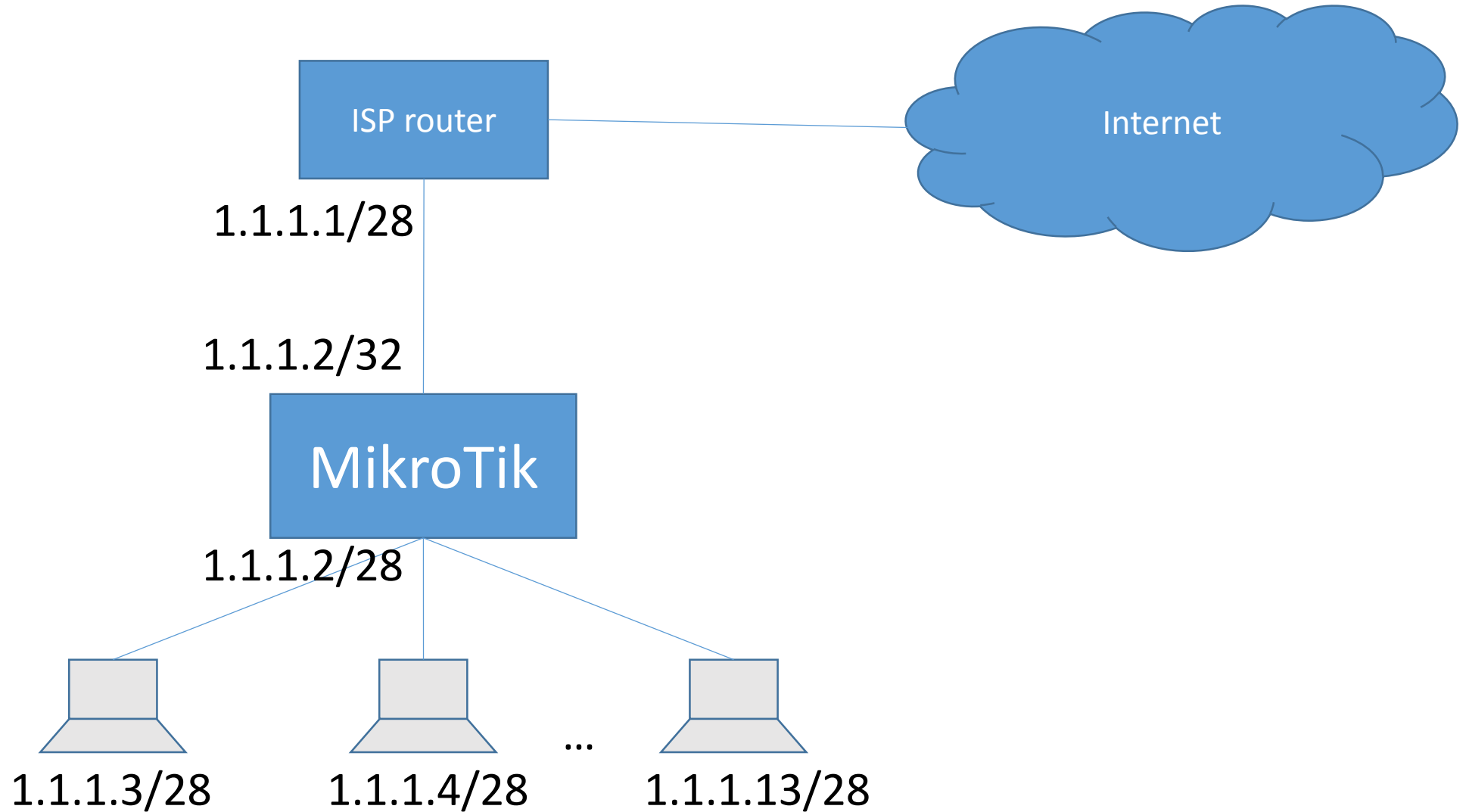
# Problem 1 – IP pool from provider



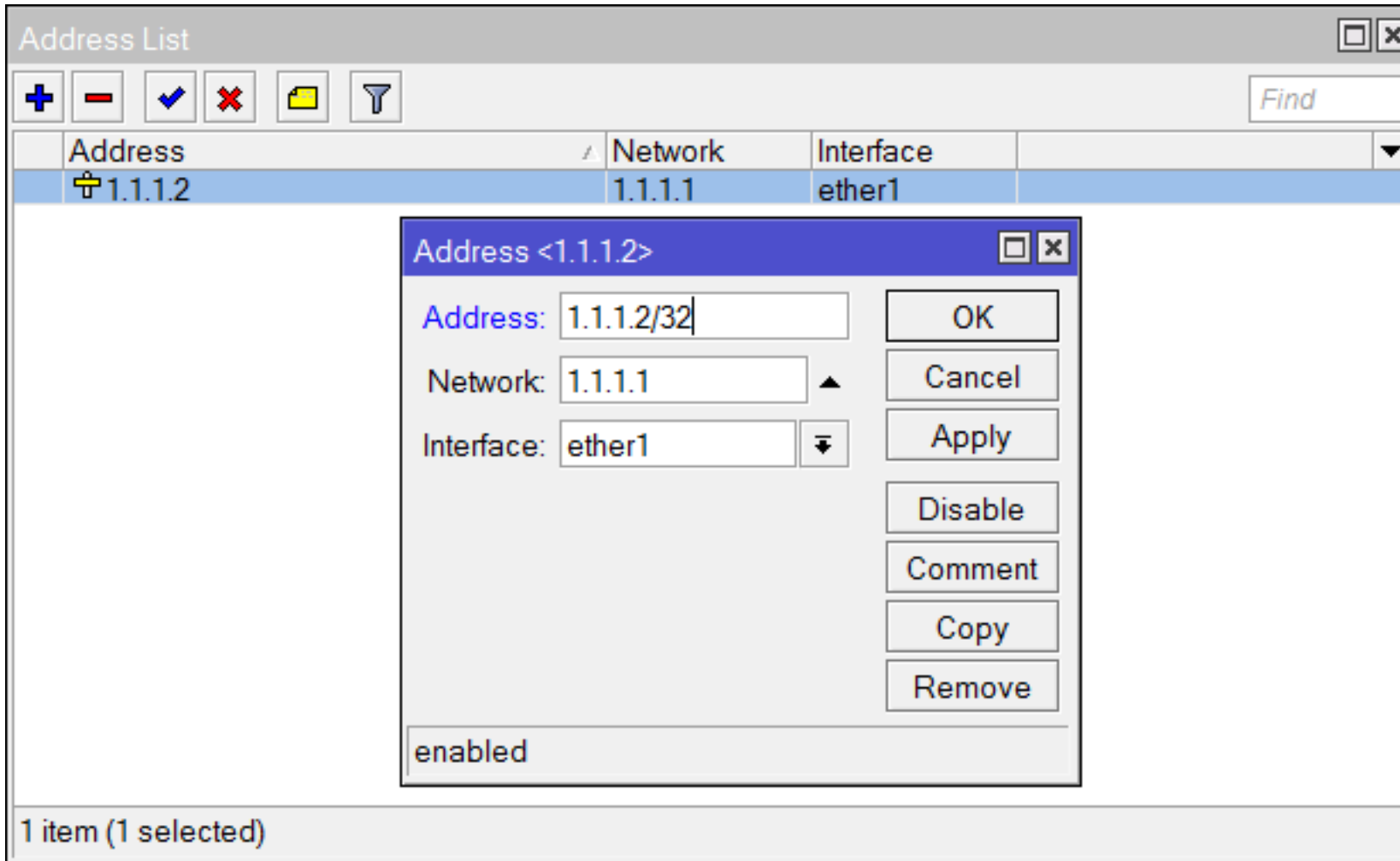
# Problem 1 – IP pool from provider



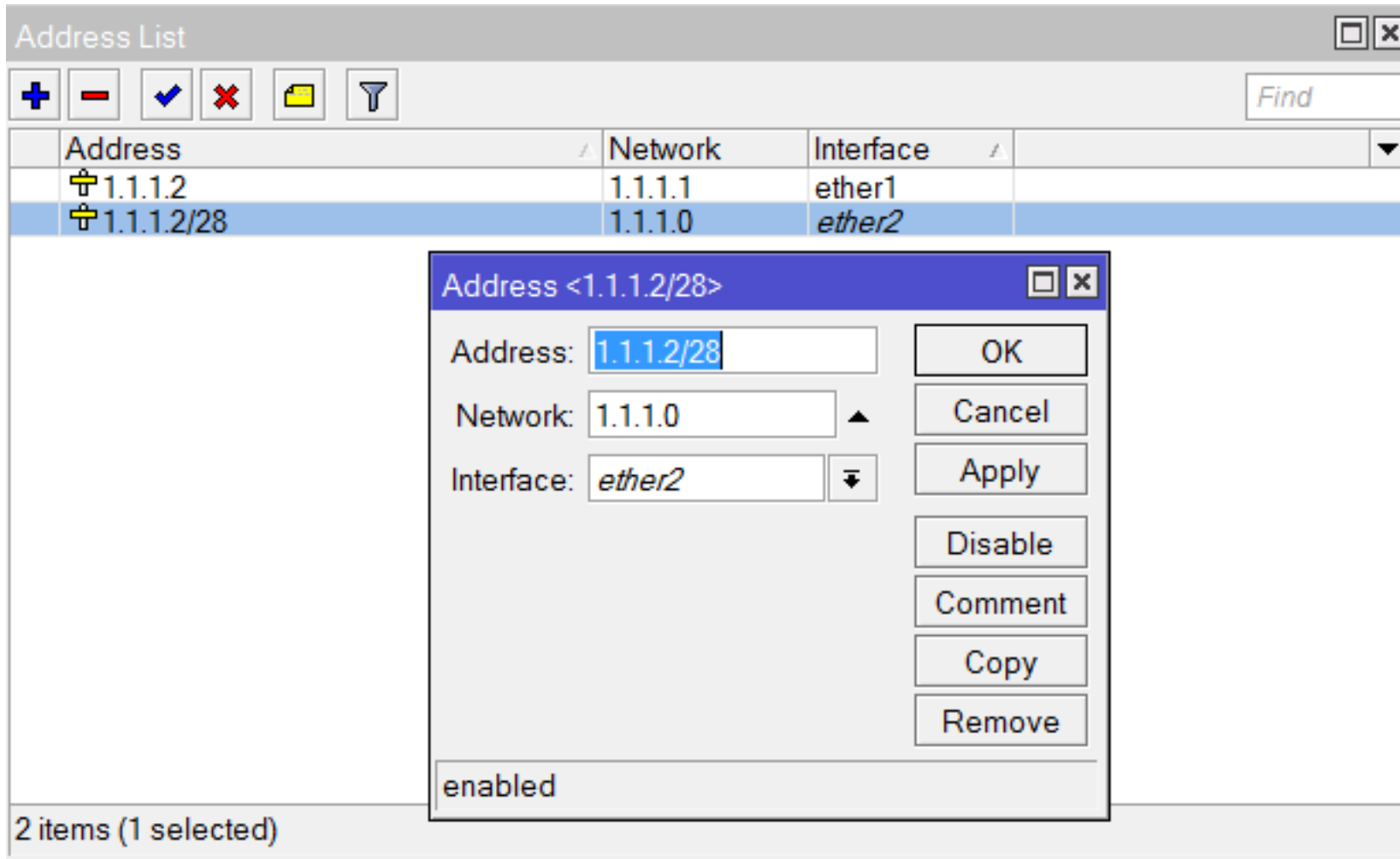
# Problem 1 – IP pool from provider



# Problem 1 – IP pool from provider



# Problem 1 – IP pool from provider



The screenshot shows the Mikrotik WinBox 'Address List' window. It contains a table with the following data:

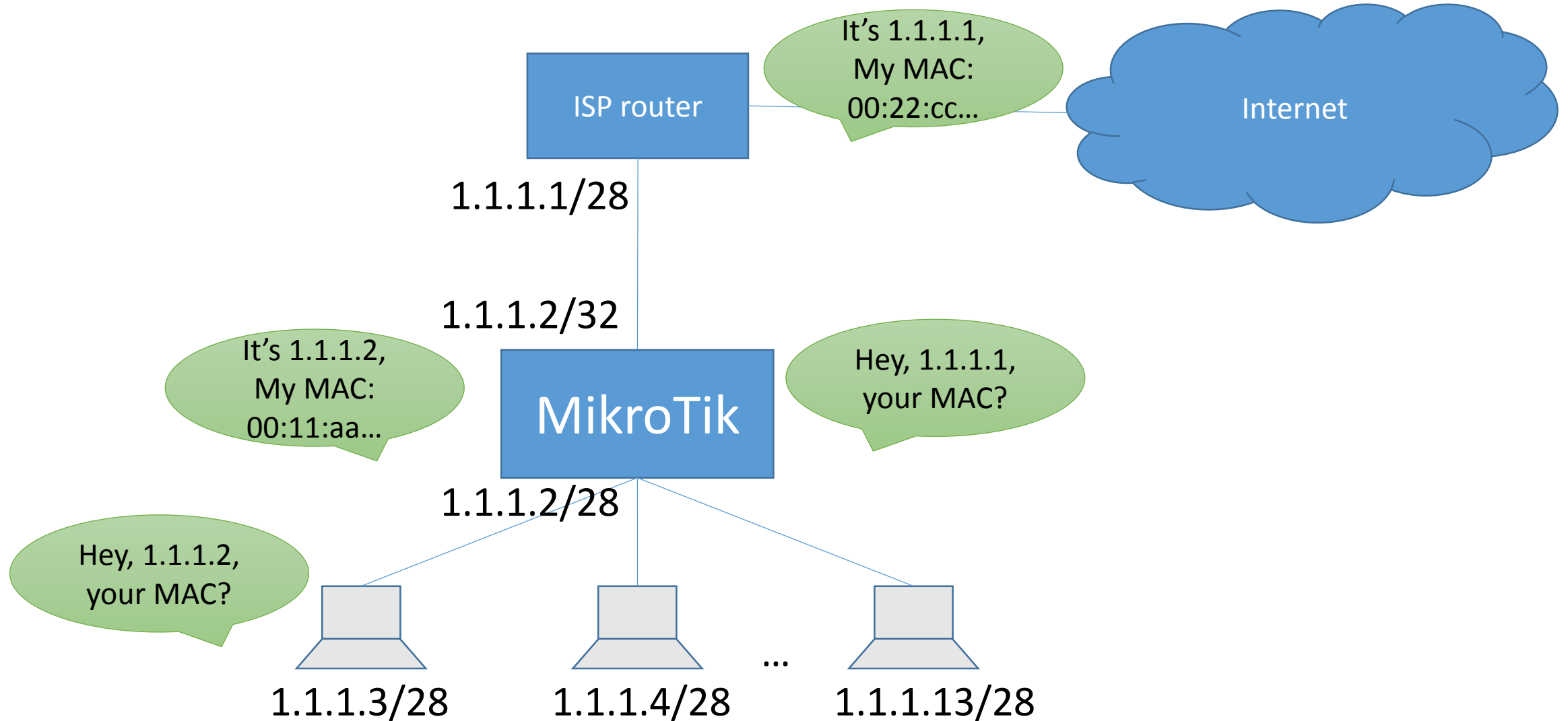
Address	Network	Interface
1.1.1.2	1.1.1.1	ether1
1.1.1.2/28	1.1.1.0	ether2

A configuration dialog for the selected address '1.1.1.2/28' is open, showing the following fields and options:

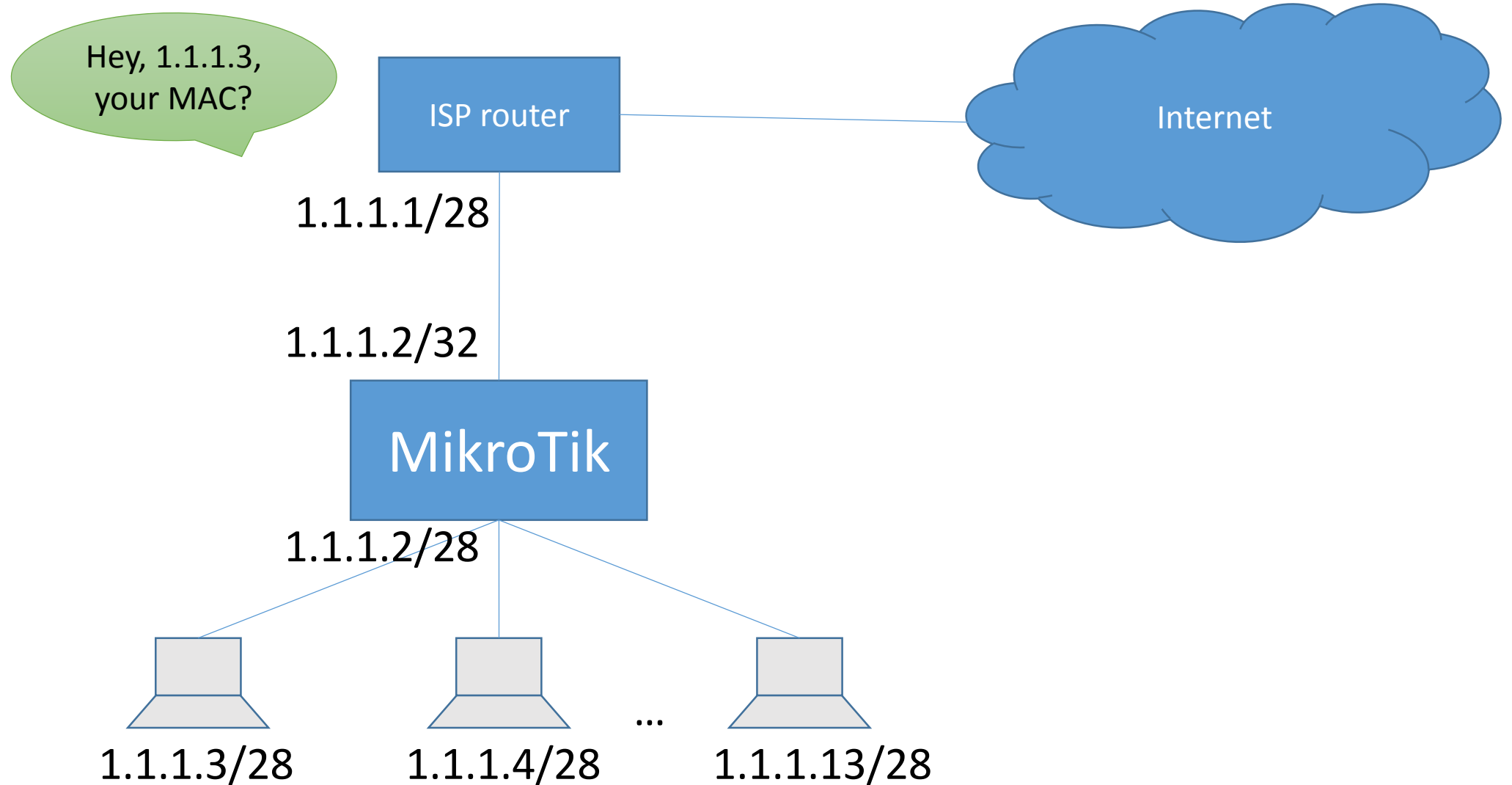
- Address: 1.1.1.2/28
- Network: 1.1.1.0
- Interface: ether2
- Buttons: OK, Cancel, Apply, Disable, Comment, Copy, Remove
- Status: enabled

At the bottom of the main window, it says '2 items (1 selected)'.

# Problem 1 – IP pool from provider



# Problem 1 – IP pool from provider

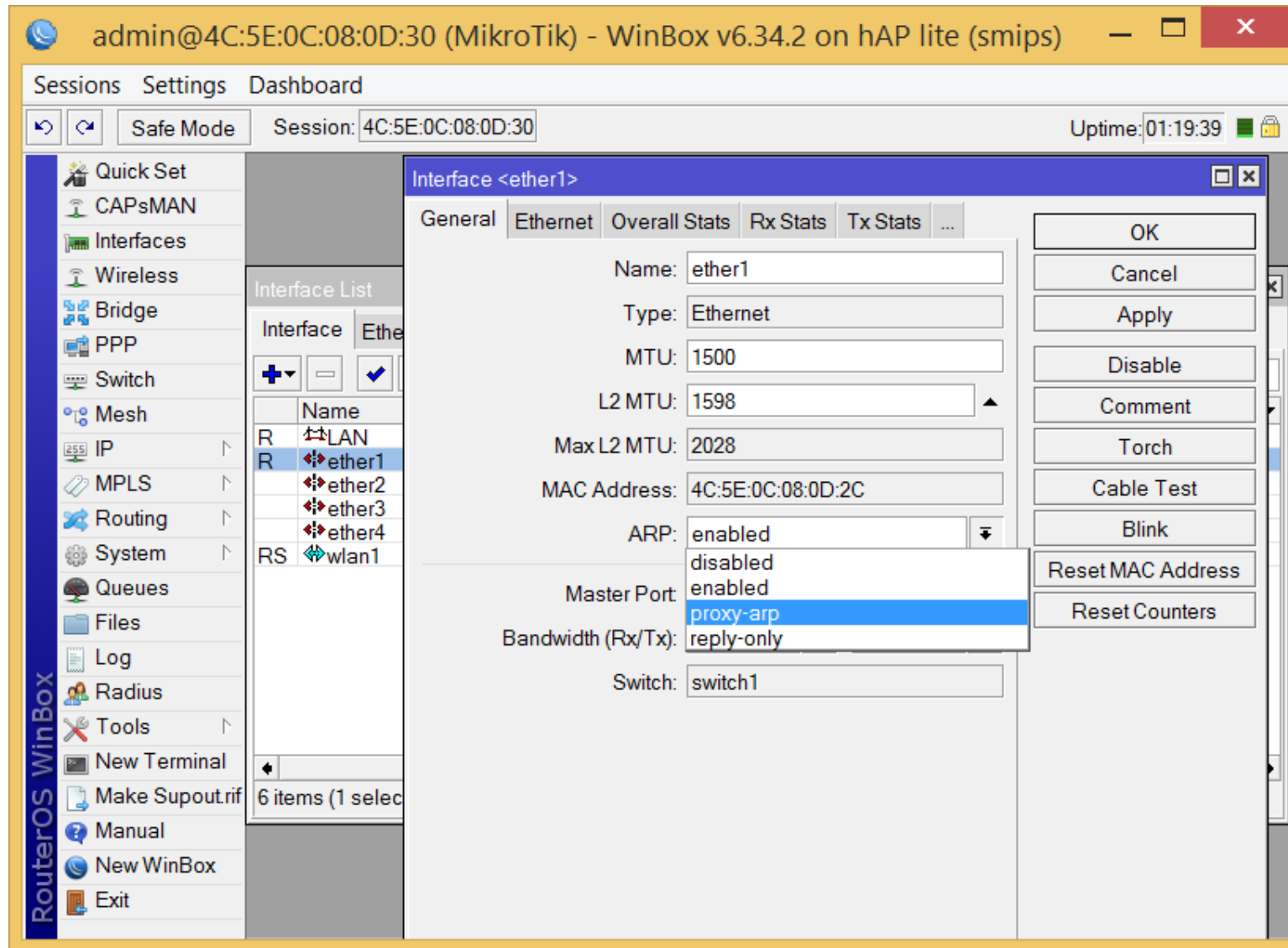




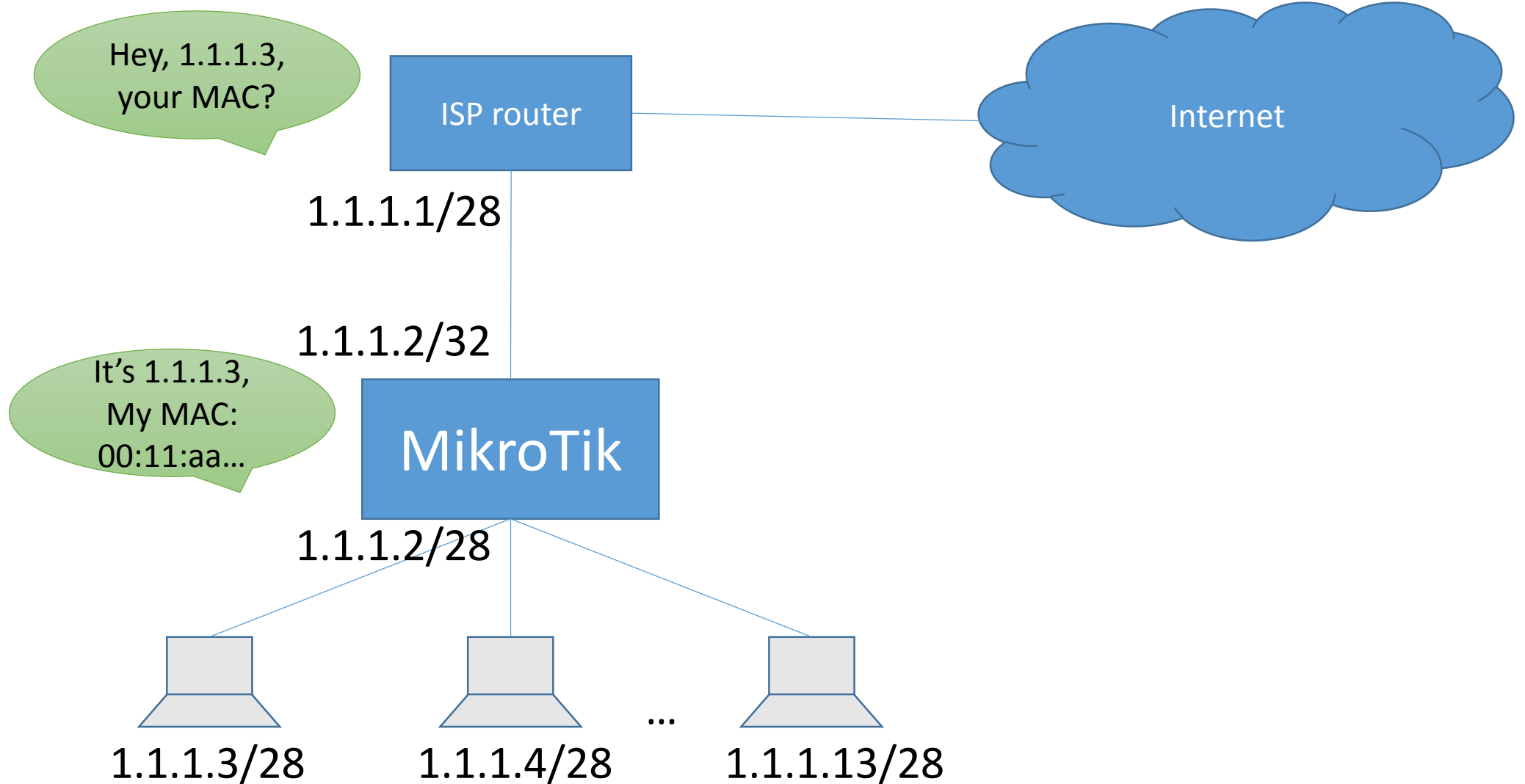
# Problem 1 – IP pool from provider

- Only thing we miss is proxy-arp on ether1
- MikroTik will respond to any ARP request on ether1 with its own MAC address if the requested IP address is on a network directly connected to the MikroTik

# Problem 1 – IP pool from provider



# Problem 1 – IP pool from provider



# We can do even more!

The screenshot shows the MikroTik WinBox interface. The main window is titled "admin@4C:5E:0C:08:0D:30 (MikroTik) - WinBox v6.34.2 on hAP lite (smips)". The left sidebar contains various configuration categories, with "IP" expanded. The "Address List" window is open, displaying a table of IP addresses. The "Special customer 2" entry is selected, and a configuration dialog box is open for it.

Address	Network	Interface
1.1.1.2	1.1.1.1	ether1
::: LAN		
1.1.1.2/28	1.1.1.0	ether2
::: Special customer 1		
1.1.1.2	1.1.1.13	ether3
::: Special customer 2		
1.1.1.2	1.1.1.14	ether4

Address <1.1.1.2>

Address: 1.1.1.2  
Network: 1.1.1.14  
Interface: ether4

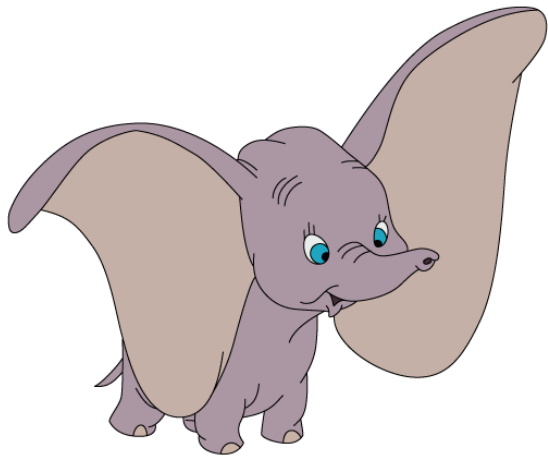
4 items (1 selected)

enabled

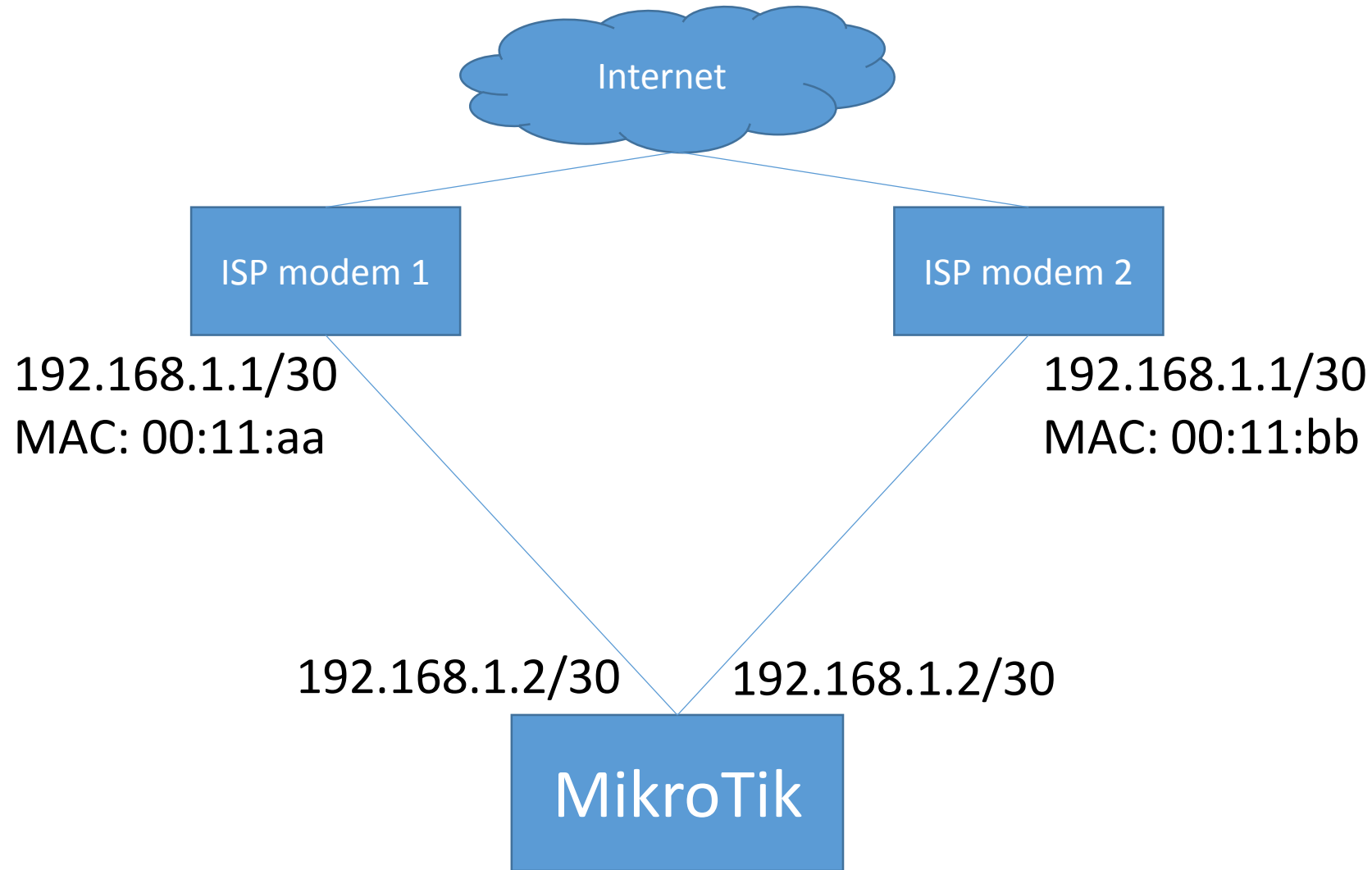
# We can do even more!

- We can add /32 addresses and proxy-arp for some special machines on separate ethernet ports
- The machines will think they are part of /28 network, we will treat them as individual networks
- The ethernet ports will not be bridged, treated as separate interfaces
- Example – we configure different DHCP server on each interface
- DHCP server giving only 1 IP address on 1 port, to any connected MAC

And now for something  
completely... crazy!



# 2 interfaces with the same IP address?



# 2 interfaces with the same IP address?

The screenshot shows the MikroTik WinBox interface. The top bar indicates the user is 'admin@4C:5E:0C:08:0D:30 (MikroTik) - WinBox v6.34.2 on hAP lite (smips)'. The main menu on the left includes options like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Make Supout.rif, Manual, New WinBox, and Exit. The 'Address List' window is open, showing a table with columns for Address, Network, and Interface. The 'Route List' window is also open, showing a table with columns for Dst Address, Gateway, Distance, Routing M..., and Pref. Sour.

Address	Network	Interface
10.0.0.1/24	10.0.0.0	LAN
192.168.1.2/30	192.168.1.0	WAN1
192.168.1.2/30	192.168.1.0	WAN2

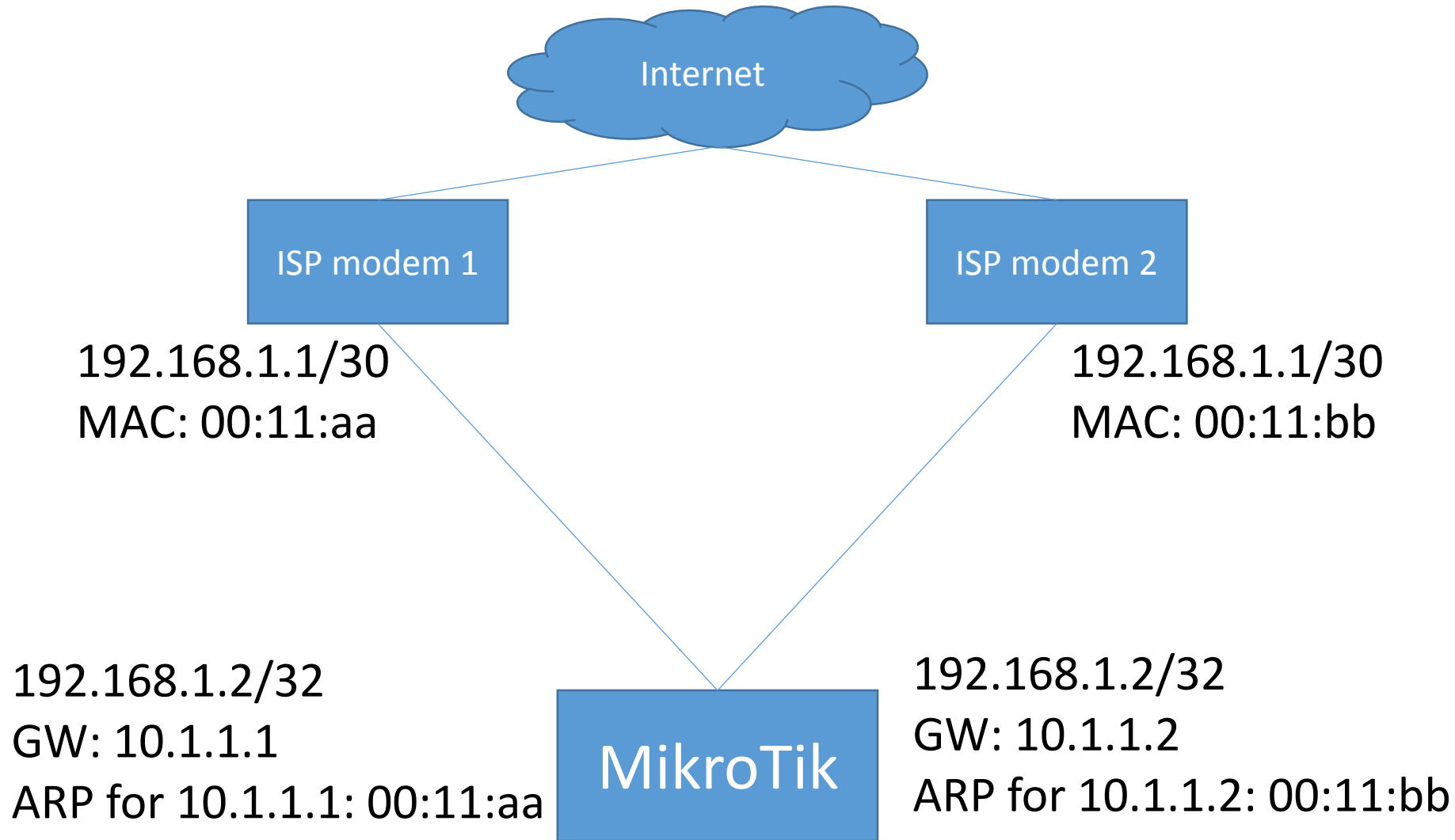
Routes	Nexthops	Rules	VRF
AS	0.0.0.0	192.168.1.1 reachable	WAN1
DAC	10.0.0.0/24	LAN reachable	
DAC	192.168.1.0/30	WAN2 reachable, WAN1 reachable	



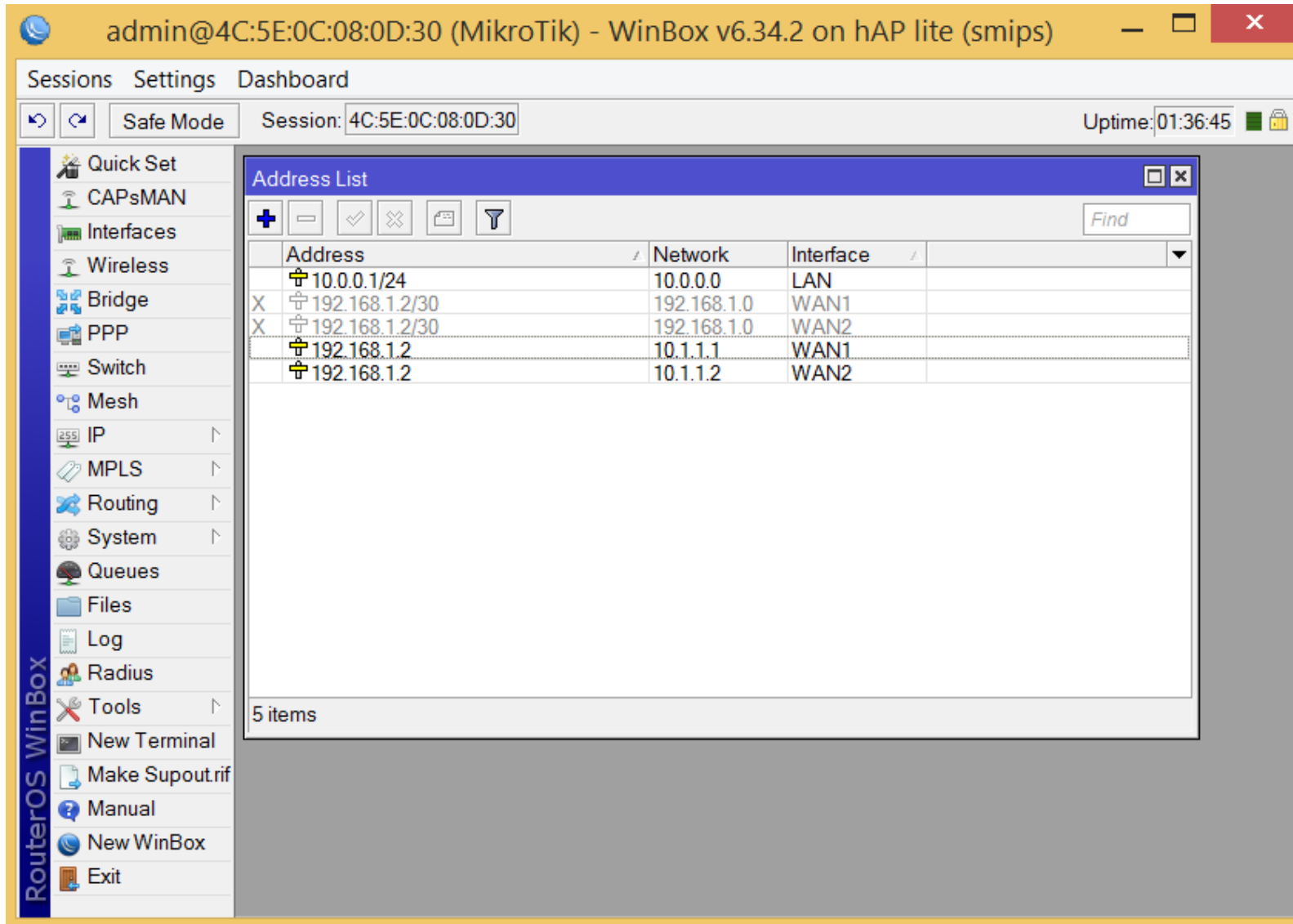
# IP and ARP – short introduction (reminder)

- We add 1.1.1.1 as our default gateway (static route to 0.0.0.0/0)
- We want to send a packet to 8.8.8.8
- MikroTik checks route to 8.8.8.8 – it fits 0.0.0.0/0, so it's via 1.1.1.1
- MikroTik checks route to 1.1.1.1 – it fits 1.1.1.0/28, so it's on ether1
- MikroTik checks 1.1.1.1's MAC address with ARP request
- MikroTik sends the packet to:
  - Destination IP: 8.8.8.8
  - Destination MAC: MAC of 1.1.1.1
- **We configure IP of gateway only to use it's MAC!!!**

# 2 interfaces with the same IP address?



# 2 interfaces with the same IP address?



The screenshot shows the Mikrotik WinBox interface. The main window displays the 'Address List' configuration page. The left sidebar contains various system settings categories. The main content area shows a table with 5 items:

Address	Network	Interface
10.0.0.1/24	10.0.0.0	LAN
X 192.168.1.2/30	192.168.1.0	WAN1
X 192.168.1.2/30	192.168.1.0	WAN2
192.168.1.2	10.1.1.1	WAN1
192.168.1.2	10.1.1.2	WAN2

5 items

# 2 interfaces with the same IP address?

The screenshot shows the MikroTik WinBox interface. The main window displays the 'Address List' configuration page. The table below shows the configured IP addresses and their associated interfaces:

Address	Network	Interface
10.0.0.1/24	10.0.0.0	LAN
X 192.168.1.2/30	192.168.1.0	WAN1
X 192.168.1.2/30	192.168.1.0	WAN2
192.168.1.2	10.1.1.1	WAN1
192.168.1.2	10.1.1.2	WAN2

An 'ARP List' window is also open, showing the ARP table for the selected IP address (192.168.1.2):

IP Address	MAC Address	Interface
10.1.1.1	00:00:00:00:00:11	WAN1
10.1.1.2	00:00:00:00:00:22	WAN2

The WinBox interface includes a sidebar with navigation options like 'Quick Set', 'CAPsMAN', 'Interfaces', 'Wireless', 'Bridge', 'PPP', 'Switch', 'Mesh', 'IP', 'MPLS', 'Routing', 'System', 'Queues', 'Files', 'Log', 'Radius', 'Tools', 'New Terminal', 'Make Supout.rif', 'Manual', 'New WinBox', and 'Exit'. The top status bar shows 'admin@4C:5E:0C:08:0D:30 (MikroTik) - WinBox v6.34.2 on hAP lite (smips)' and 'Uptime: 01:40:12'.

# 2 interfaces with the same IP address?

The screenshot shows the MikroTik WinBox interface. The top bar indicates the user is 'admin@4C:5E:0C:08:0D:30 (MikroTik)' on 'WinBox v6.34.2 on hAP lite (smips)'. The session is '4C:5E:0C:08:0D:30' and the uptime is '01:41:26'. The left sidebar contains various configuration options like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Make Supout.rif, Manual, New WinBox, and Exit.

The main window displays two windows:

- Address List:** A table showing IP addresses and their assigned interfaces.
- Route List:** A table showing routing entries with their destinations, gateways, and interfaces.

Address	Network	Interface
10.0.0.1/24	10.0.0.0	LAN
X 192.168.1.2/30	192.168.1.0	WAN1
X 192.168.1.2/30	192.168.1.0	WAN2
192.168.1.2	10.1.1.1	WAN1

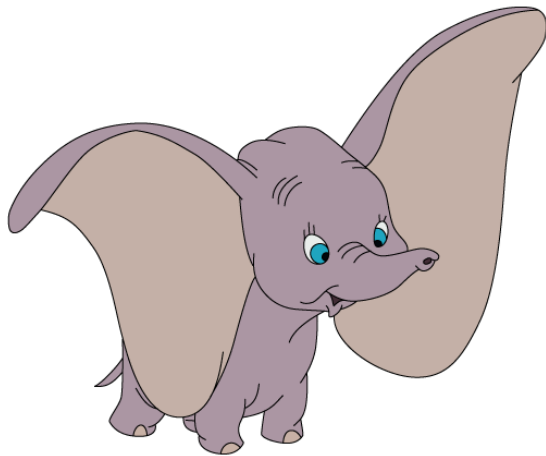
  

Routes	Nexthops	Rules	VRF
Dst. Address	Gateway	Distance	Routing M... Pref. Sour
AS 0.0.0.0/0	10.1.1.1 reachable WAN1	1	wan1
AS 0.0.0.0/0	10.1.1.2 reachable WAN2	1	wan2
DAC 10.0.0.0/24	LAN reachable	0	10.0.0.1
DAC 10.1.1.1	WAN1 reachable	0	192.168.1.2
DAC 10.1.1.2	WAN2 reachable	0	192.168.1.2

# 2 interfaces with the same IP address?

- We can use the 2 gateways simultaneously
- We can use them for different routing marks and do load balancing
- We can do a normal failover if one of the links goes down (but not using “check-gateway”)
- We can write a script to periodically check the MAC addresses for ARP
- If the IP addresses are given by DHCP, we can also write the script to set the 2 gateways.

Questions?  
Comments?



# Thanks!

