IPv6 On Mikrotik

Mikrotik **U**ser **M**eeting
Armenia Yerevan
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Agenda

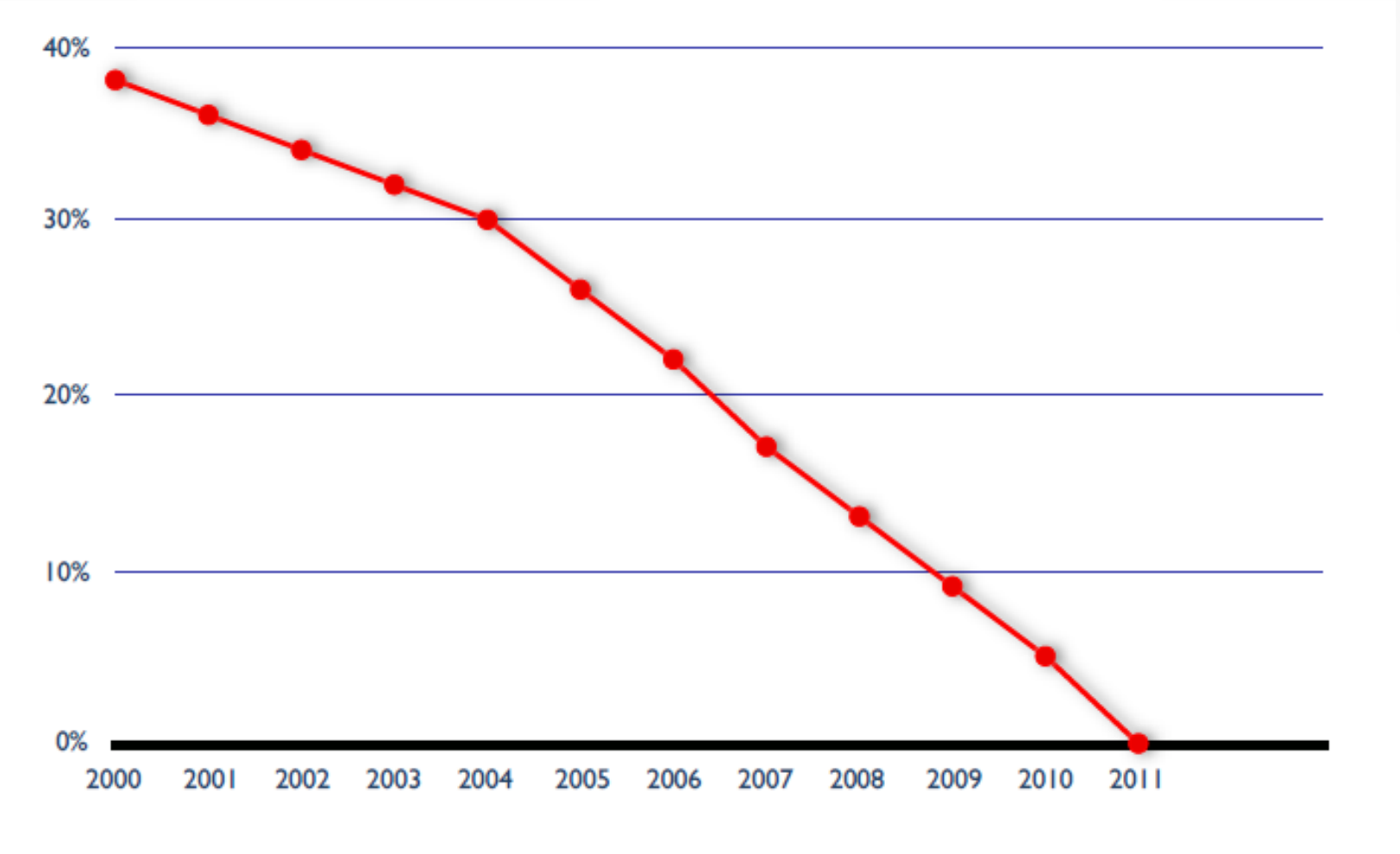
- IPv4?
- IPv6 address Basics
- Getting an IPv6
- Deploying
- Transition mechanisms
- QA
- Demo - IPv6 Address Configuration on ROS
- Demo - Tunnel Broker + Configuration on ROS

IPv4?

IPv4- Reaching the next billion

- Around 3,675 billion Internet users now.
  - around 50,1 % of all people in the world
- Mobile phones are Internet devices
- The Internet of Things
  - How will the Internet look like in 5 - 10 years?

IPv4- IANA IPv4 Pool



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IPv4- Exhaustion

“On 14 September 2012, the RIPE NCC ran out of their regular pool of IPv4”

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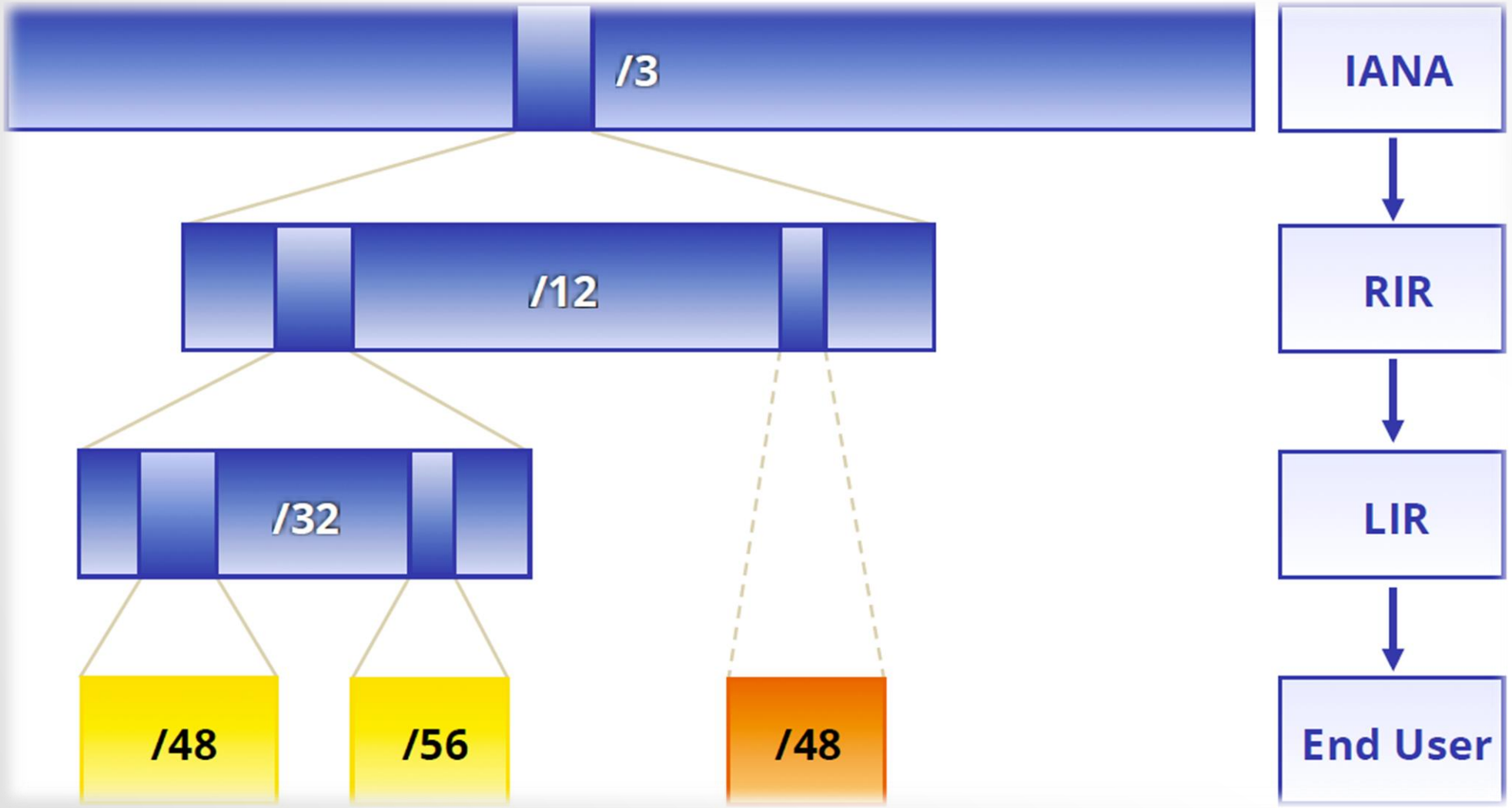
IPv4- Network Address Translation

- Extends the capacity of the IPv4 address space by sharing an IPv4 address between clients
- Fairly common technology, used everywhere
- Breaks the end to end connectivity model
- It doesn't allow communication with IPv6!
- You are probably going to need it in some form

IPv6 Address Basics

IP Address Distribution



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IPv6 Address Basics

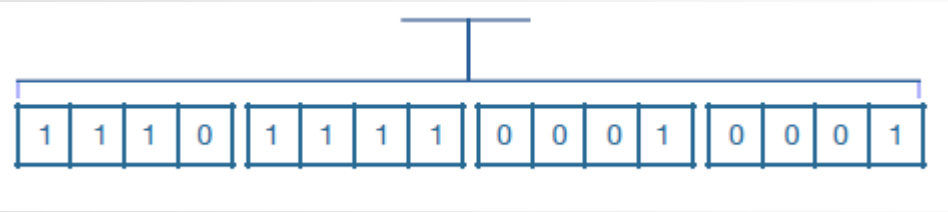
- IPv6 address: 128 bits
  - 32 bits in IPv4
- Every subnet should be a /64
- Customer assignments (sites) between:
  - /64 (1 subnet)
  - /48 (65,536 subnets)
  - Minimum allocation size /32
    - 65,536 /48s
    - 16,777,216 /56s

Address Notation

2001:0db8:003e:ef11:0000:0000:c100:004d

2001:0db8:003e:ef11:0000:0000:c100:004d

2001:db8:3e:ef11:0:0:c100:4d



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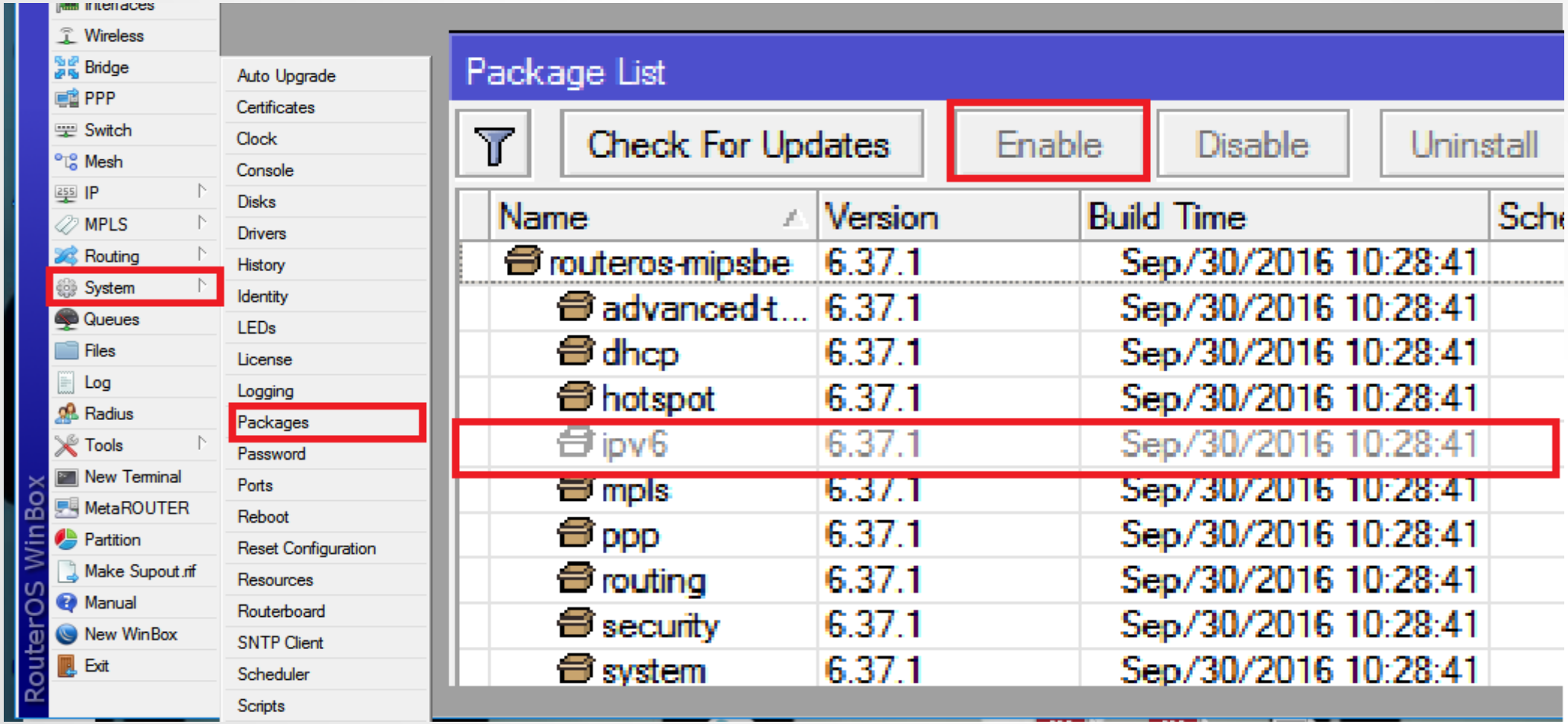
Multiple address types

Addresses	Range	Scope
Unspecified	::/128	n/a
Loopback	::1	Host
IPv4-Embedded	64:ff9b::/96	n/a
Discard-Only	100::/64	n/a
Link Local	fe80::/10	Link
Global Unicast	2000::/3	Global
Unique Local	fc00::/7	Global
Multicast	ff00::/8	variable

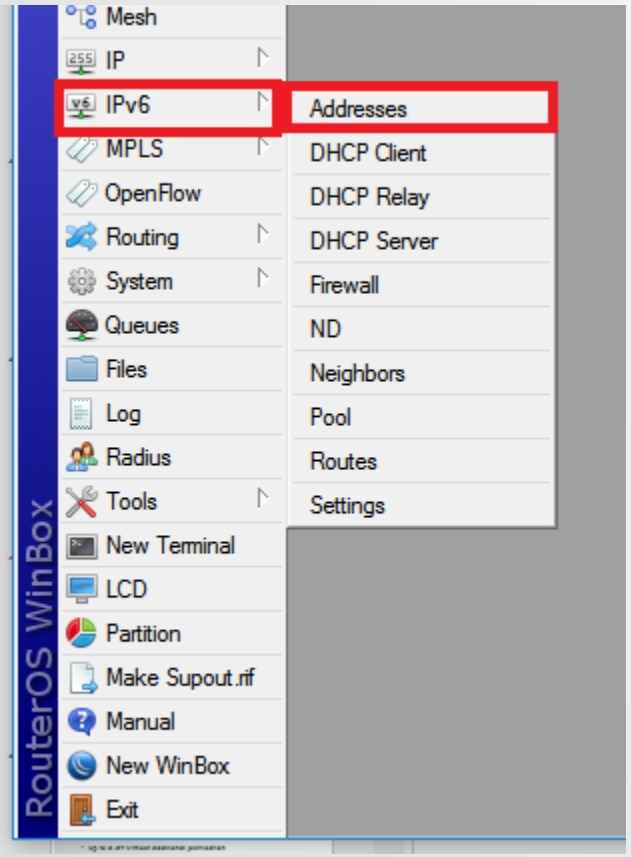
Demo- IPv6 address configuration

- IPv6 package is not enabled by default



Demo- IPv6 address configuration

- After RouterOs / Routerboard reboot IPv6 menu appearance in Winbox



IPv6 Address List

Find

	Address	From Pool	Interface	Advertise
DL	fe80::5c76:61a3/64		sit1	no
DL	fe80::90:8dff:fe8c:ae6e/64		1111	no
DL	fe80::e68d:8cff:fe2b:3310/64		V-100-PUBLIC-...	no
DL	fe80::e68d:8cff:fe2b:3310/64		V-598-L2-INTE...	no
DL	fe80::e68d:8cff:fe2b:3310/64		Bonding-2960	no
DL	fe80::e68d:8cff:fe2b:3310/64		B-V-20	no
DL	fe80::e68d:8cff:fe2b:3312/64		B-V-110	no
DL	fe80::e68d:8cff:fe2b:3312/64		B-V-150	no
DL	fe80::e68d:8cff:fe2b:3312/64		Bonding-SG300	no
DL	fe80::e68d:8cff:fe2b:3312/64		V-140-INTERN...	no
DL	fe80::e68d:8cff:fe2b:3316/64		B-V-300	no
DL	fe80::e68d:8cff:fe2b:3316/64		B-V-130	no
DL	fe80::e68d:8cff:fe2b:3316/64		B-V-249	no
DL	fe80::e68d:8cff:fe2b:3316/64		V-598-INTERN...	no
DL	fe80::e68d:8cff:fe2b:3316/64		Bonding-OLT	no

15 items

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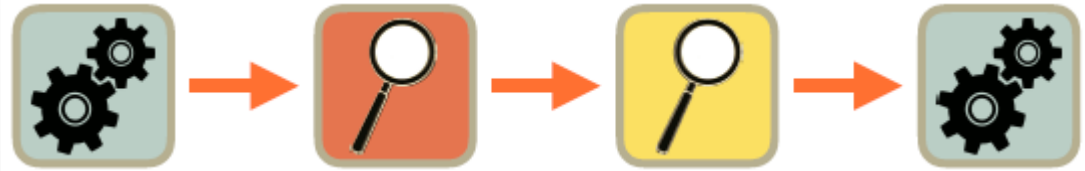
IPv6 Protocol Basics

IPv6 Protocol Functions

- Address Auto configuration
  - Supported by Neighbor Discovery
  - Stateless - with SLAAC
  - Stateful - with DHCPv6
- Neighbor Discovery Protocol
- Replaces ARP from IPv4
  - Uses ICMPv6 and Multicast
  - Finds the other IPv6 devices on the link
  - Keeps track of reachability

The Auto configuration Process

1. Make a Link-Local address
2. Check for duplicates on the link
3. Search for a router
4. Make a Global Unicast address



Deploying IPv6

IPv6 Address Management

- Your spreadsheet might not scale
  - There are 65.536 /64s in a /48
  - There are 65.536 /48s in a /32
  - There are 524.288 /48s in a /29
  - There are 16.777.216 /56s in a /32
  - There are 134.217.728 /56s in a /29
- Find a suitable IPAM solution

Transition Mechanisms

Transitioning: Solving Two Problems

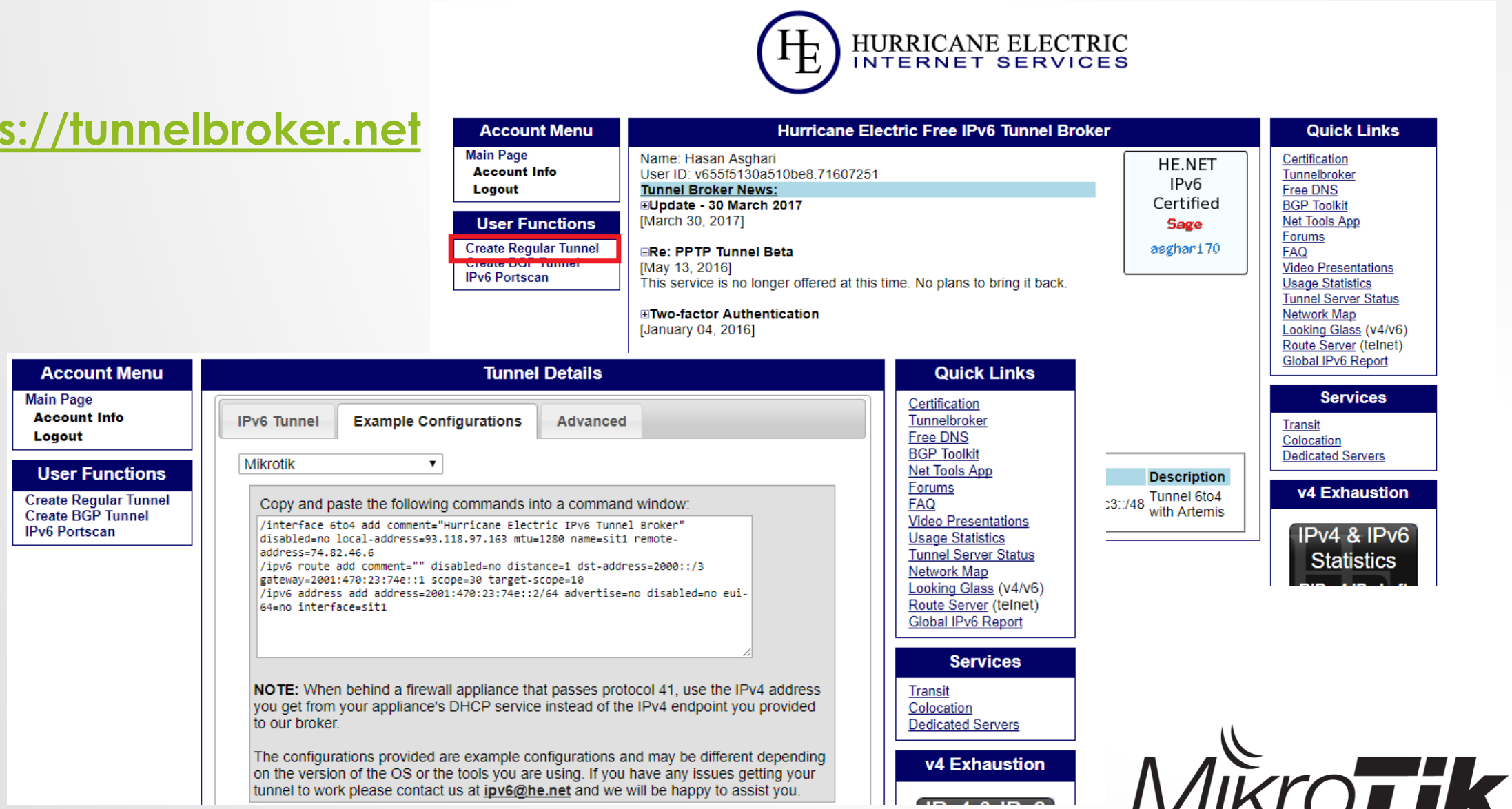
- Maintaining connectivity to IPv4 hosts by sharing IPv4 addresses between clients
  - Extending the address space with NAT/CGN/LSN
  - Translating between IPv6 and IPv4
  - Provide a mechanism to connect to the emerging IPv6-only networks
  - Tunneling IPv6 packets over IPv4-only networks

Transitioning

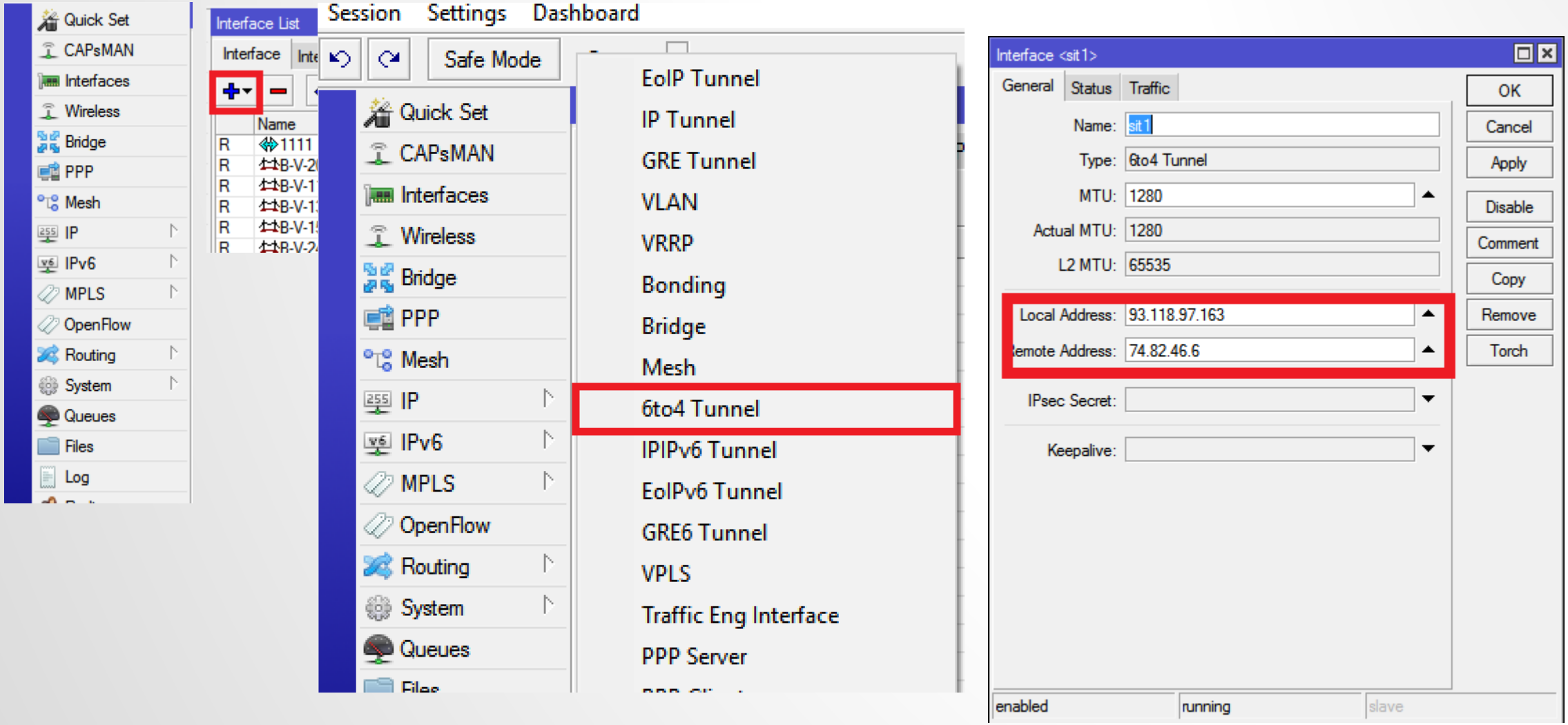
- 6to4
- 6RD
- DS-Lite
- 6in4
- Teredo
- NAT64
- Dual Stack

Demo-Tunnel broker

- https://tunnelbroker.net



Demo-Tunnel broker-Mikrotik side



Also you can paste commands in Terminal

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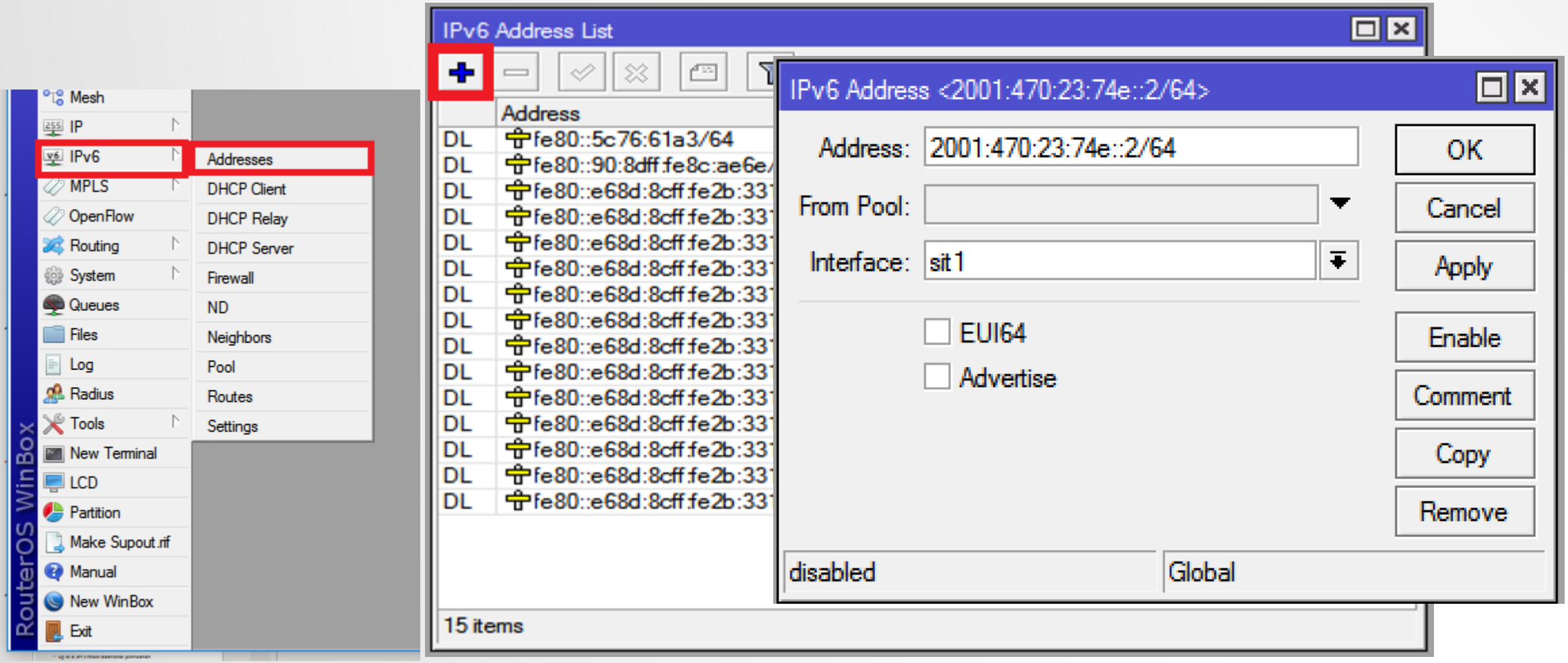
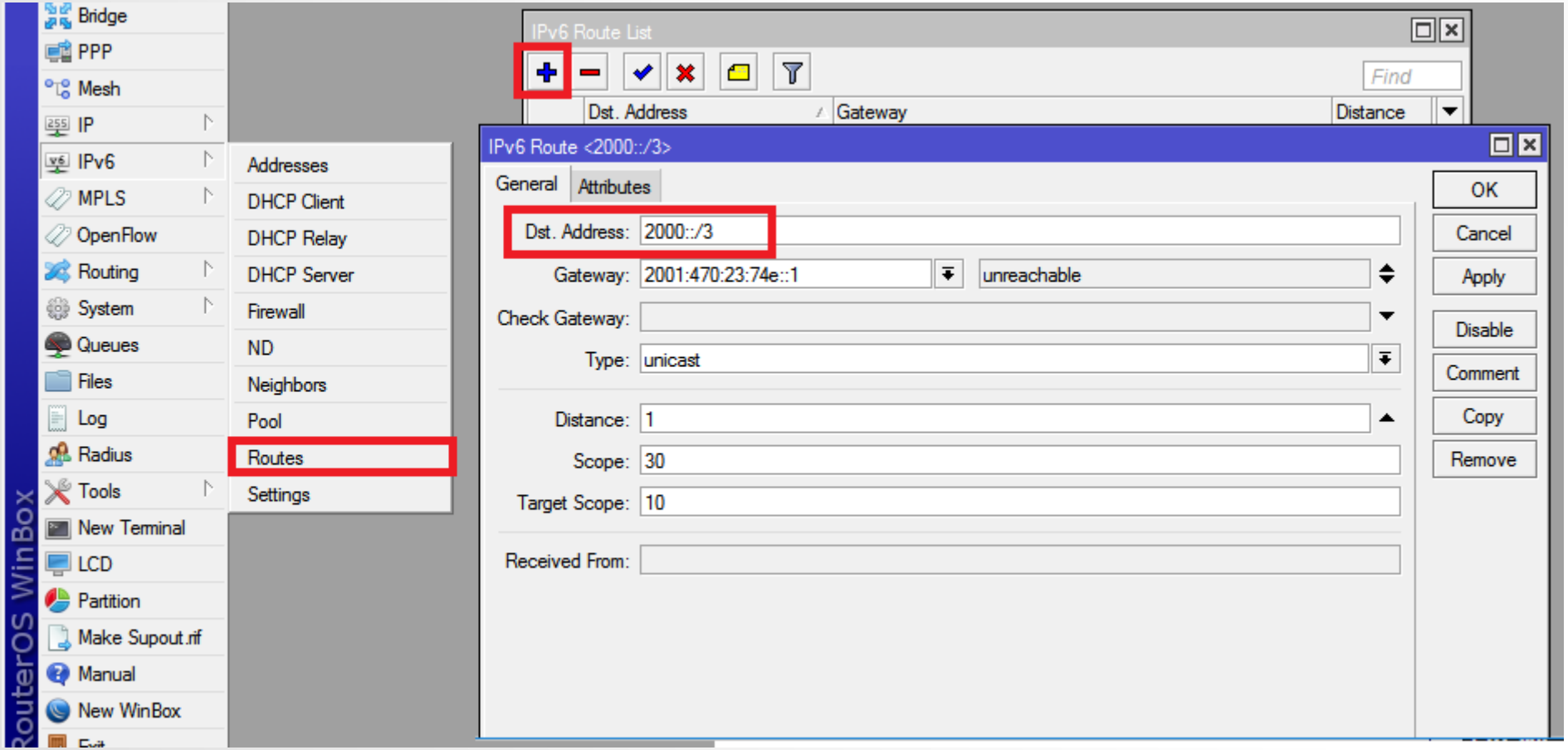
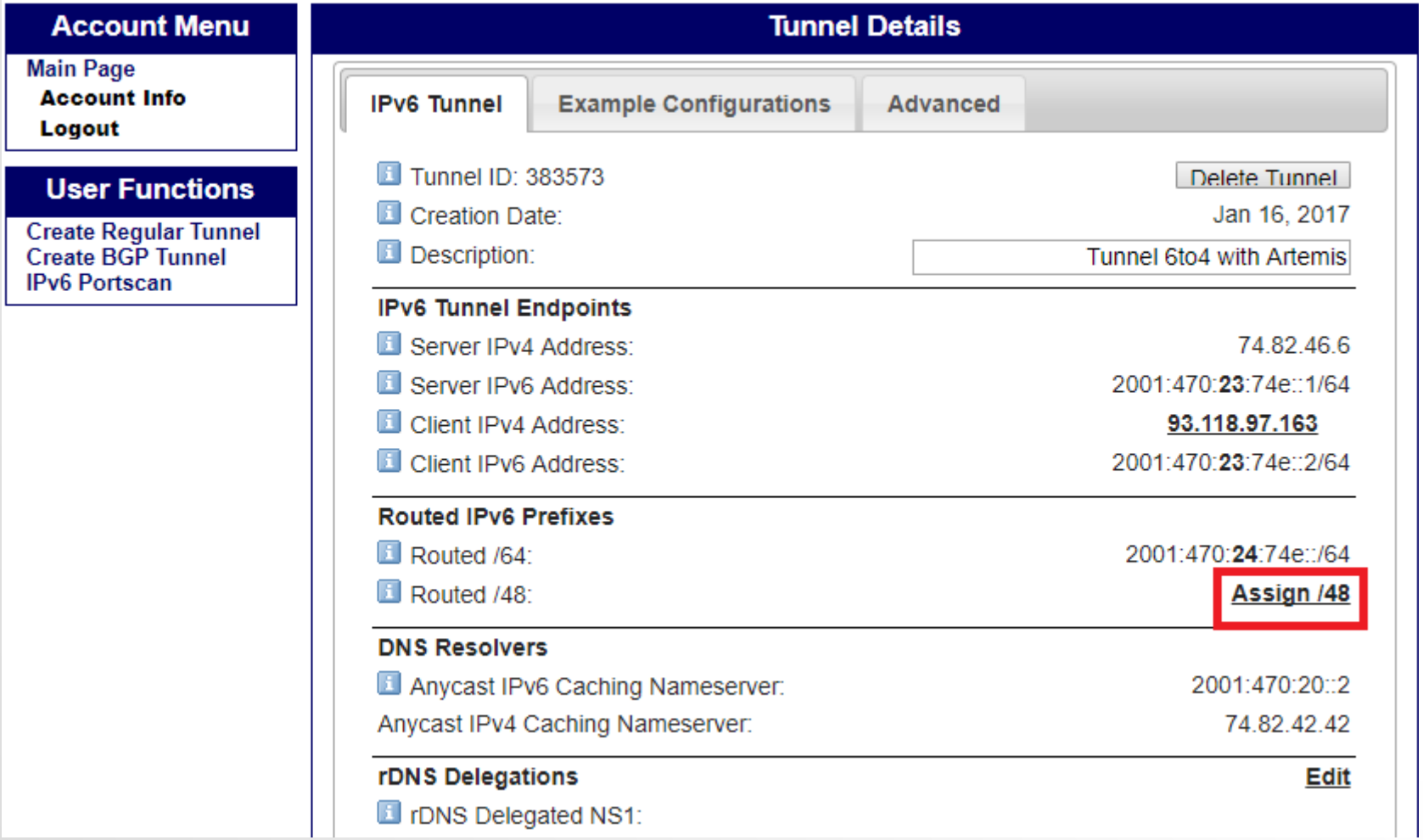
Demo-Tunnel broker-Mikrotik side



Demo-Tunnel broker-Mikrotik side



Demo-Tunnel broker-Request More IPv6



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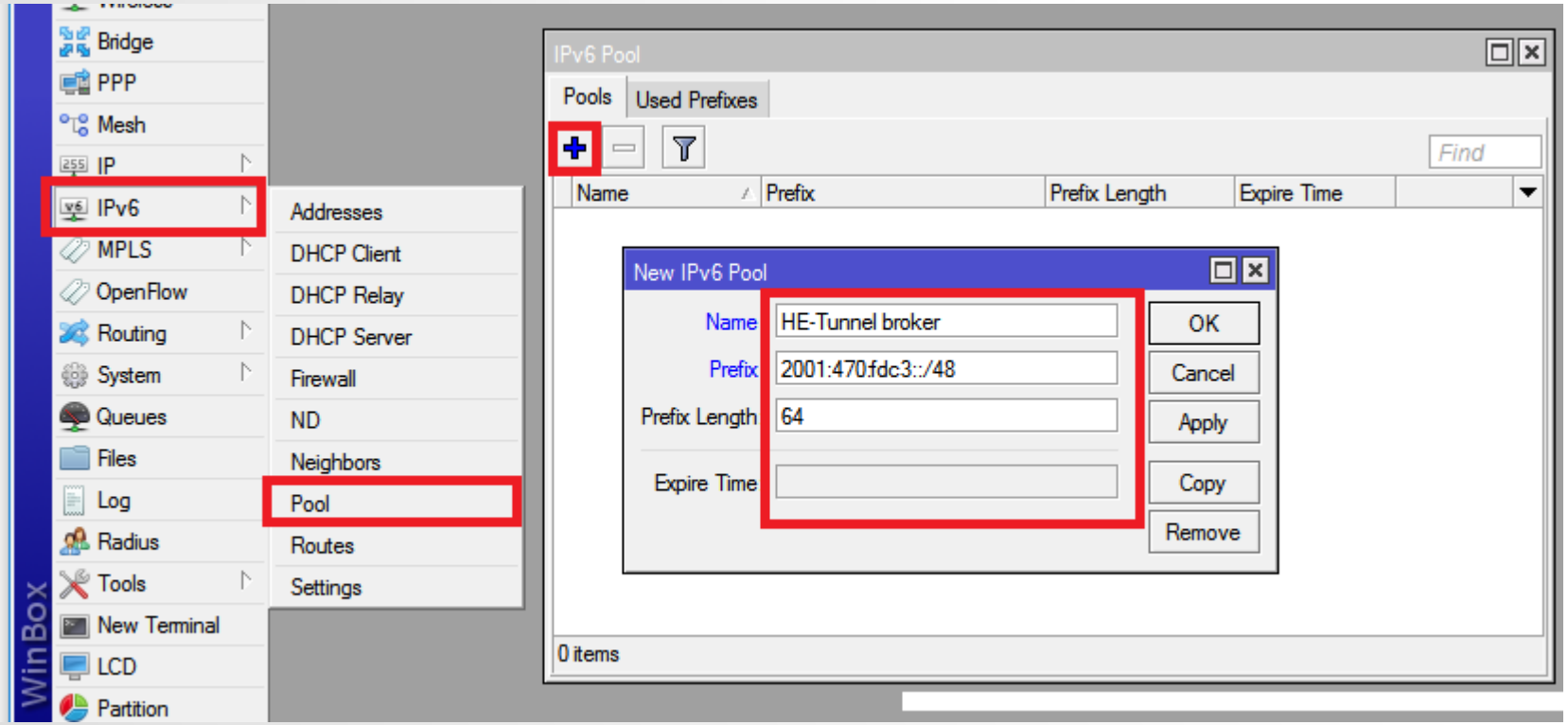
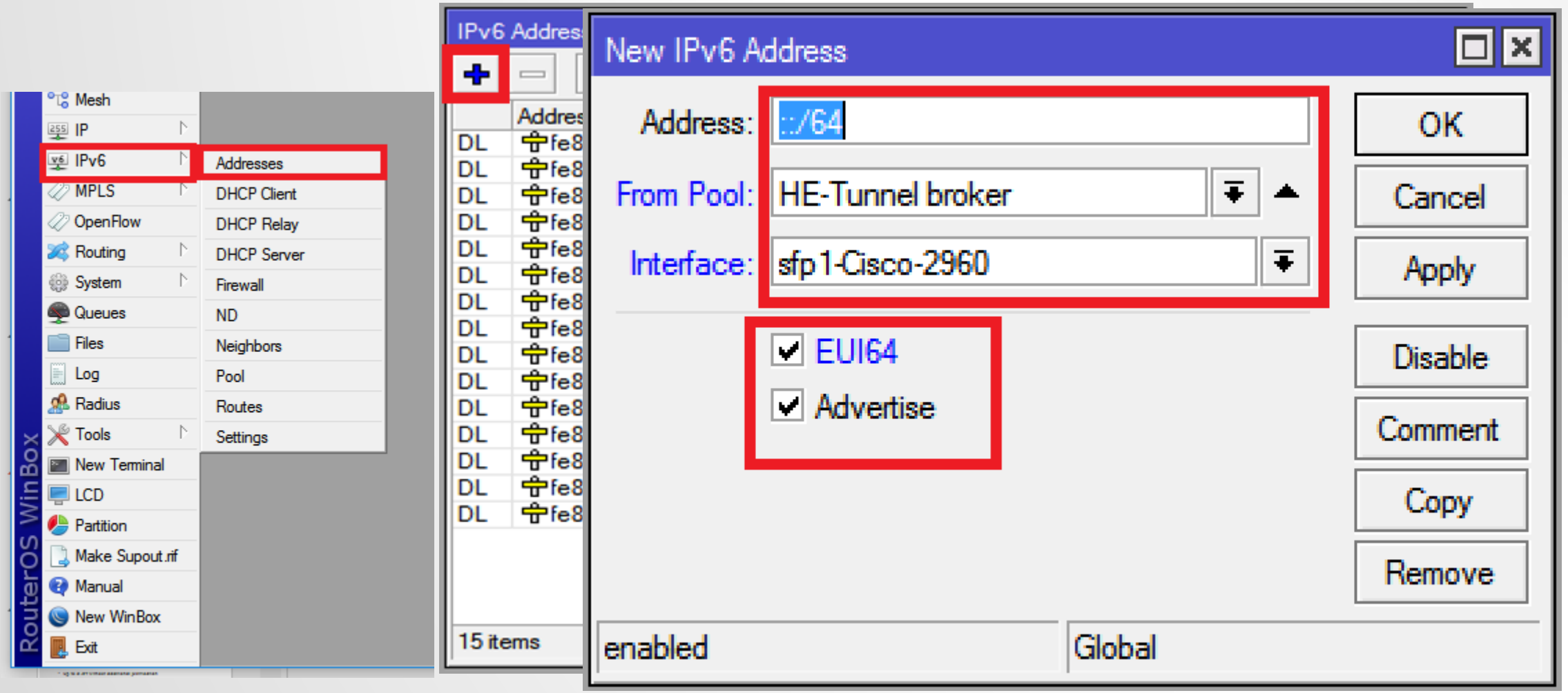
Demo-Tunnel broker-More IPv6 – Mikrotik side

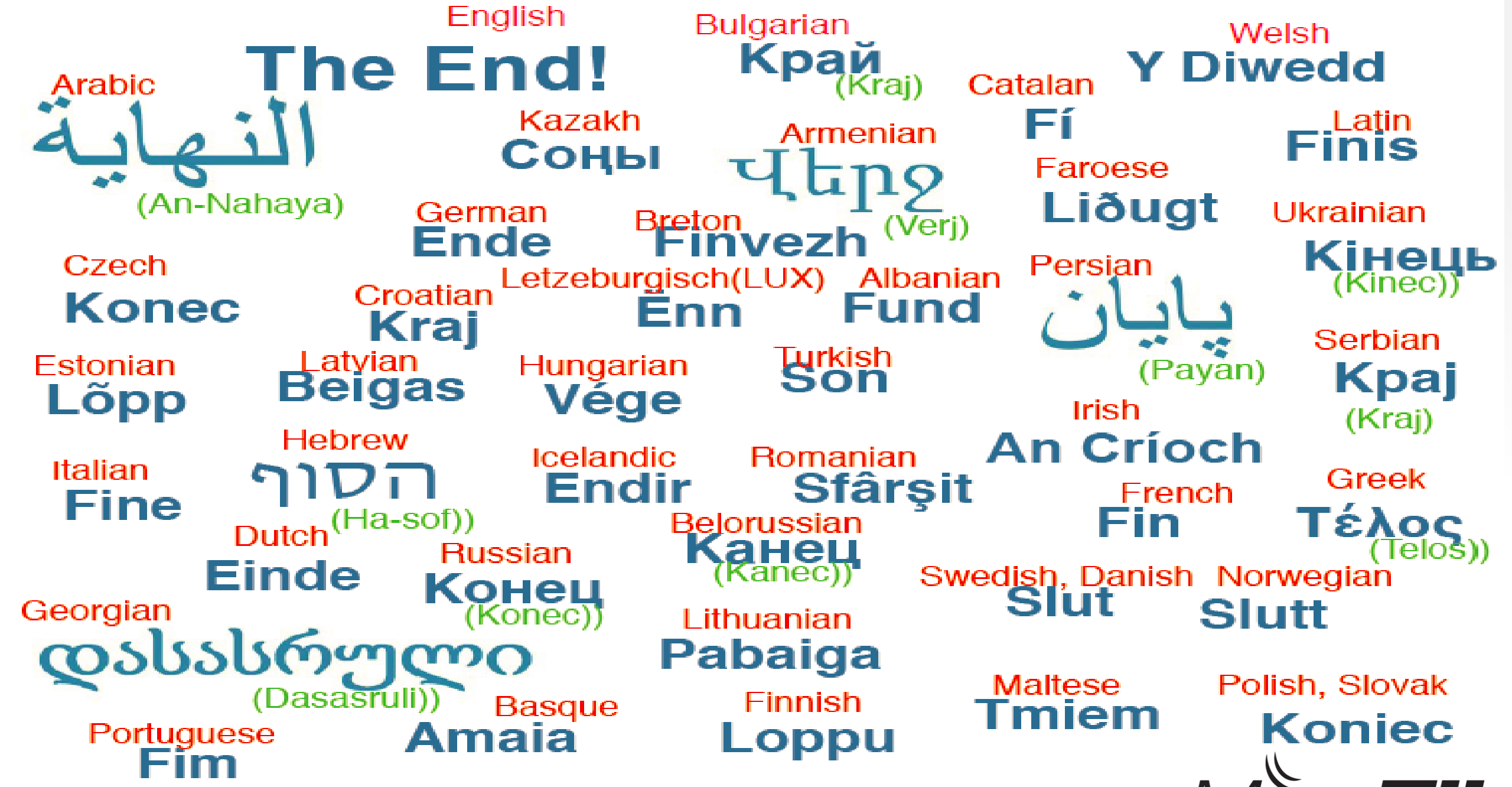


Demo-Tunnel broker-More IPv6 – Mikrotik side



Q/A

Any question ?


English
The End!
Bulgarian
Край
(Kraj)
Welsh
Y Diwedd
Arabic
النهاية
(An-Nahaya)
Kazakh
Соңы
Armenian
վերջ
(Verj)
Catalan
Fí
Latin
Finis
Faroese
Liðugt
German
Ende
Breton
Finvezh
Ukrainian
Кінець
(Kinec))
Czech
Konec
Letzeburgisch(LUX)
Albanian
Fund
Persian
پایان
(Payan)
Croatian
Kraj
Ënn
Serbian
Крај
(Kraj)
Estonian
Lõpp
Latvian
Beigas
Hungarian
Vége
Turkish
Son
Irish
An Críoch
Hebrew
הסוף
(Ha-sof))
Icelandic
Endir
Romanian
Sfârşit
Italian
Fine
French
Fin
Greek
Τέλος
(Telos))
Dutch
Einde
Belorussian
Канец
(Kanec))
Russian
Конец
(Konec))
Swedish, Danish
Slut
Norwegian
Slutt
Georgian
დასასრული
(Dasasruli))
Lithuanian
Pabaiga
Maltese
Tmiem
Polish, Slovak
Koniec
Basque
Amaia
Finnish
Loppu
Portuguese
Fim