

IP Addresses and ARP

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General Information

Summary

The following Manual discusses IP address management and the Address Resolution Protocol settings. IP addresses serve as identification when communicating with other network devices using the TCP/IP protocol. In turn, communication between devices in one physical network proceeds with the help of Address Resolution Protocol and ARP addresses.

Specifications

Packages required: *system*

License required: *level1*

Home menu level: */ip address, /ip arp*

Standards and Technologies: *[IP](#), [ARP](#)*

Hardware usage: *Not significant*

Related Documents

- [Software Package Management](#)

IP Addressing

Home menu level: */ip address*

Description

IP addresses serve for a general host identification purposes in IP networks. Typical (IPv4) address consists of four octets. For proper addressing the router also needs the network mask value, *id est* which bits of the complete IP address refer to the address of the host, and which - to the address of the network. The network address value is calculated by binary **AND** operation from network mask and IP address values. It's also possible to specify IP address followed by slash "/" and amount of bits assigned to a network mask.

In most cases, it is enough to specify the address, the netmask, and the interface arguments. The network prefix and the broadcast address are calculated automatically.

It is possible to add multiple IP addresses to an interface or to leave the interface without any addresses assigned to it. Leaving a physical interface without an IP address is not a must when the bridging between interfaces is used. In case of bridging, the IP address can be assigned to any interface in the bridge, but actually the address will belong to the bridge interface. You can use **/ip address print detail** to see to which interface the address belongs to.

MikroTik RouterOS has following types of addresses:

- **Static** - manually assigned to the interface by a user
- **Dynamic** - automatically assigned to the interface by established ppp, pptp, or pppoe connections

Property Description

actual-interface (*read-only: name*) - only applicable to logical interfaces like bridges or tunnels. Holds the name of the actual hardware interface the logical one is bound to.

address (*IP address*) - IP address

broadcast (*IP address; default: 255.255.255.255*) - broadcasting IP address, calculated by default from an IP address and a network mask

disabled (yes | no; default: **no**) - specifies whether the address is disabled or not

interface (*name*) - interface name the IP address is assigned to

netmask (*IP address; default: 0.0.0.0*) - specifies network address part of an IP address

network (*IP address; default: 0.0.0.0*) - IP address for the network. For point-to-point links it should be the address of the remote end

Notes

You cannot have two different IP addresses from the same network assigned to the router. *Exempli gratia*, the combination of IP address **10.0.0.1/24** on the **ether1** interface and IP address **10.0.0.132/24** on the **ether2** interface is invalid, because both addresses belong to the same network **10.0.0.0/24**. Use addresses from different networks on different interfaces, or enable **proxy-arp** on **ether1** or **ether2**.

Example

```
[admin@MikroTik] ip address> add address=10.10.10.1/24 interface=ether2
[admin@MikroTik] ip address> print
Flags: X - disabled, I - invalid, D - dynamic
#   ADDRESS           NETWORK           BROADCAST         INTERFACE
0   2.2.2.1/24         2.2.2.0          2.2.2.255        ether2
1   10.5.7.244/24     10.5.7.0         10.5.7.255       ether1
2   10.10.10.1/24     10.10.10.0       10.10.10.255     ether2
[admin@MikroTik] ip address>
```

Address Resolution Protocol

Home menu level: */ip arp*

Description

Even though IP packets are addressed using IP addresses, hardware addresses must be used to actually transport data from one host to another. Address Resolution Protocol is used to map OSI level 3 IP addresses to OSI level 2 MAC addresses. A router has a table of currently used ARP entries. Normally the table is built dynamically, but to increase network security, it can be built statically by means of adding static entries.

Property Description

address (*IP address*) - IP address to be mapped

interface (*name*) - interface name the IP address is assigned to

mac-address (*MAC address*; default: **00:00:00:00:00:00**) - MAC address to be mapped to

Notes

Maximal number of ARP entries is 8192.

If arp feature is turned off on the interface, i.e., **arp=disabled** is used, ARP requests from clients are not answered by the router. Therefore, static arp entry should be added to the clients as well. For example, the router's IP and MAC addresses should be added to the Windows workstations using the **arp** command:

```
C:\> arp -s 10.5.8.254 00-aa-00-62-c6-09
```

If **arp** property is set to **reply-only** on the interface, then router only replies to ARP requests. Neighbour MAC addresses will be resolved using **/ip arp** statically.

Example

```
[admin@MikroTik] ip arp> add address=10.10.10.10 interface=ether2 mac-address=06 \
\... :21:00:56:00:12
[admin@MikroTik] ip arp> print
Flags: X - disabled, I - invalid, H - DHCP, D - dynamic
#   ADDRESS           MAC-ADDRESS       INTERFACE
0   D 2.2.2.2         00:30:4F:1B:B3:D9 ether2
1   D 10.5.7.242     00:A0:24:9D:52:A4 ether1
2   10.10.10.10     06:21:00:56:00:12 ether2
[admin@MikroTik] ip arp>
```

If static arp entries are used for network security on an interface, you should set arp to 'reply-only' on that interface. Do it under the relevant **/interface** menu:

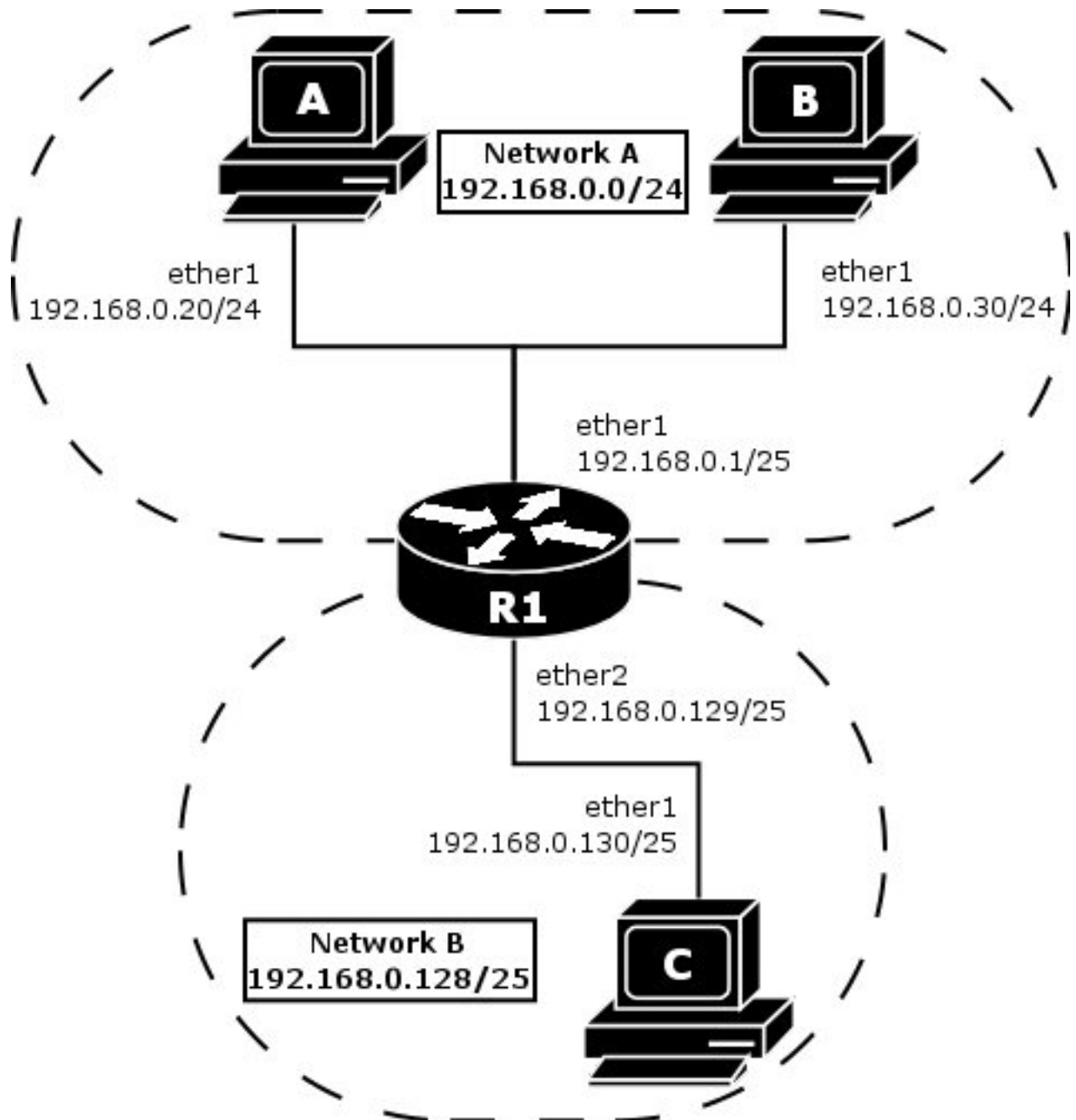
```
[admin@MikroTik] ip arp> /interface ethernet set ether2 arp=reply-only
[admin@MikroTik] ip arp> print
Flags: X - disabled, I - invalid, H - DHCP, D - dynamic
# ADDRESS MAC-ADDRESS INTERFACE
0 D 10.5.7.242 00:A0:24:9D:52:A4 ether1
1 10.10.10.10 06:21:00:56:00:12 ether2

[admin@MikroTik] ip arp>
```

Proxy-ARP feature

Description

A router with properly configured proxy ARP feature acts like a transparent ARP proxy between directly connected networks. Consider the following network diagram:



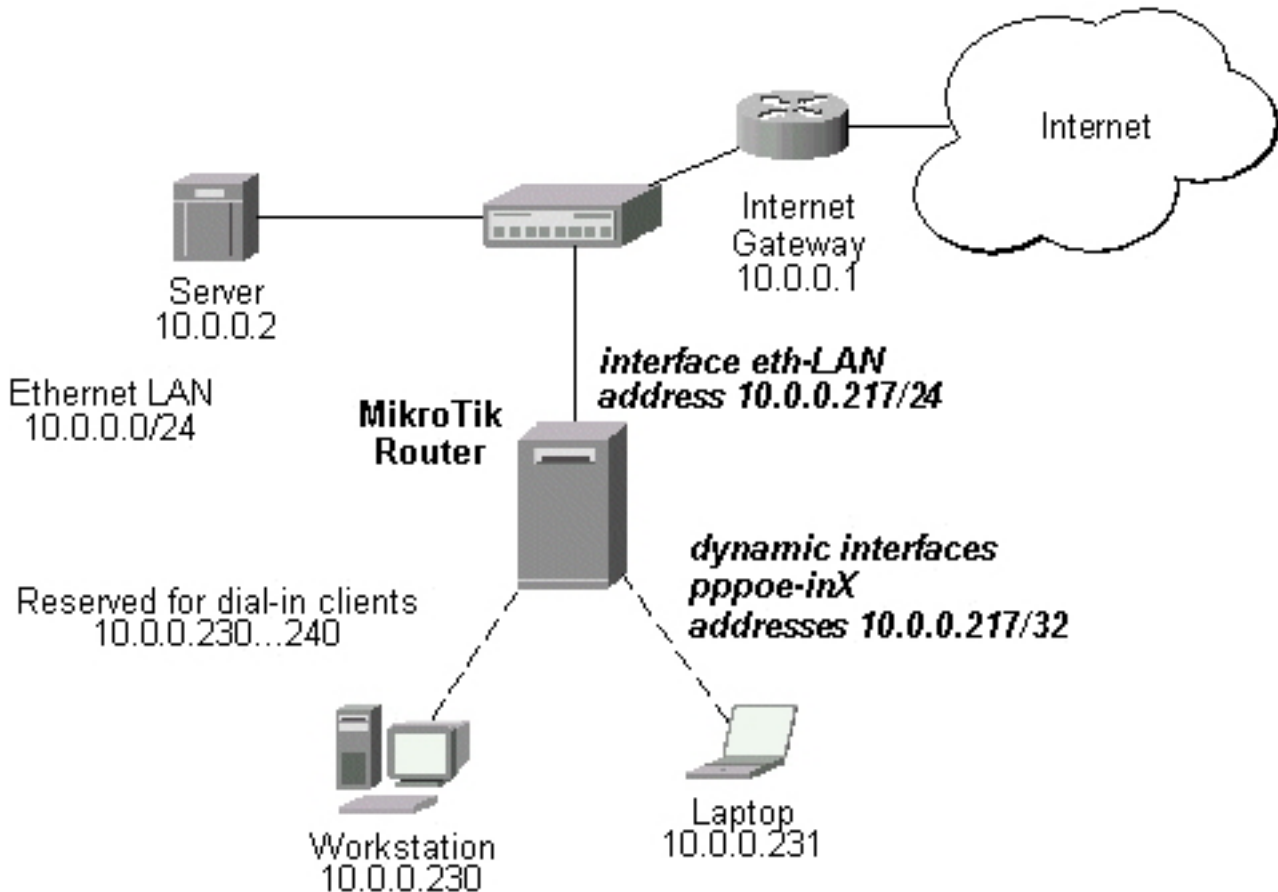
Suppose the host A needs to communicate to host C. To do this, it needs to know host's C MAC address. As shown on the diagram above, host A has /24 network mask. That makes host A to believe that it is directly connected to the whole 192.168.0.0/24 network. When a computer needs to communicate to another one on a directly connected network, it sends a broadcast ARP request. Therefore host A sends a broadcast ARP request for the host C MAC address.

Broadcast ARP requests are sent to the broadcast MAC address FF:FF:FF:FF:FF:FF. Since the ARP request is a broadcast, it will reach all hosts in the network A, including the router R1, but it will not reach host C, because routers do not forward broadcasts by default. A router with enabled proxy ARP knows that the host C is on another subnet and will reply with its own MAC address. The router with enabled proxy ARP always answer with its own MAC address if it has a route to the destination.

This behaviour can be useful, for example, if you want to assign dial-in (ppp, pppoe, pptp) clients IP addresses from the same address space as used on the connected LAN.

Example

Consider the following configuration:



The MikroTik Router setup is as follows:

```
admin@MikroTik] ip arp> /interface ethernet print
Flags: X - disabled, R - running
#  NAME      MTU  MAC-ADDRESS  ARP
0  R eth-LAN  1500  00:50:08:00:00:F5  proxy-arp
[admin@MikroTik] ip arp> /interface print
Flags: X - disabled, D - dynamic, R - running
#  NAME      TYPE  MTU
0  eth-LAN  ether  1500
1  prism1   prism  1500
2  D pppoe-in25  pppoe-in
3  D pppoe-in26  pppoe-in
[admin@MikroTik] ip arp> /ip address print
Flags: X - disabled, I - invalid, D - dynamic
#  ADDRESS      NETWORK  BROADCAST  INTERFACE
0  10.0.0.217/24  10.0.0.0  10.0.0.255  eth-LAN
1  D 10.0.0.217/32  10.0.0.230  0.0.0.0     pppoe-in25
2  D 10.0.0.217/32  10.0.0.231  0.0.0.0     pppoe-in26
[admin@MikroTik] ip arp> /ip route print
Flags: X - disabled, I - invalid, D - dynamic, J - rejected,
C - connect, S - static, R - rip, O - ospf, B - bgp
#  DST-ADDRESS  G GATEWAY  DISTANCE  INTERFACE
0  S 0.0.0.0/0   r 10.0.0.1  1         eth-LAN
```

```

1 DC 10.0.0.0/24      r 0.0.0.0      0      eth-LAN
2 DC 10.0.0.230/32   r 0.0.0.0      0      pppoe-in25
3 DC 10.0.0.231/32   r 0.0.0.0      0      pppoe-in26
[admin@MikroTik] ip arp>

```

Unnumbered Interfaces

Description

Unnumbered interfaces can be used on serial point-to-point links, e.g., MOXA or Cyclades interfaces. A private address should be put on the interface with the network being the same as the address on the router on the other side of the p2p link (there may be no IP on that interface, but there is an ip for that router).

Example

```

[admin@MikroTik] ip address> add address=10.0.0.214/32 network=192.168.0.1 \
\... interface=pppsync
[admin@MikroTik] ip address> print
Flags: X - disabled, I - invalid, D - dynamic
#   ADDRESS          NETWORK          BROADCAST        INTERFACE
0   10.0.0.214/32     192.168.0.1     192.168.0.1     pppsync
[admin@MikroTik] ip address>
[admin@MikroTik] ip address> .. route print detail
Flags: X - disabled, I - invalid, D - dynamic, J - rejected,
C - connect, S - static, R - rip, O - ospf, B - bgp
0   S dst-address=0.0.0.0/0 preferred-source=0.0.0.0 gateway=192.168.0.1
    gateway-state=reachable distance=1 interface=pppsync

1   DC dst-address=192.168.0.1/32 preferred-source=10.0.0.214
    gateway=0.0.0.0 gateway-state=reachable distance=0 interface=pppsync

[admin@MikroTik] ip address>

```

As you can see, a dynamic connected route has been automatically added to the routes list. If you want the default gateway be the other router of the p2p link, just add a static route for it. It is shown as **0** in the example above.

Troubleshooting

Description

- **Router shows that the IP address is invalid**
Check whether the interface exists to which the IP address is assigned. Or maybe it is disabled. It is also possible that the system has crashed - reboot the router.
- **Router shows that the ARP entry is invalid**
Check whether the interface exists to which the ARP entry is assigned. Or maybe it is disabled. Check also for an IP address for the particular interface.