

TD – laboratorium 0

Piotr Rogulski 305867

Szymon Sieradzki 305881

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1 Schemat adresacji

Tablica 1: Adresacja ipv4

R1	192.168.0.1/24
R2	192.168.0.2/24

Tablica 2: Adresacja ipv6

R1	2001:DB8:0:1::2/64
R2	2001:DB8:0:1::1/64

2 Konfiguracja ipv4

2.1 Konfiguracja routera R1

W celu konfiguracji routera R1, na początek należy nadać mu adres ipv4 192.168.0.1/24 .

Ustawianie adresu ipv4 dla R1

```
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#in e0/0
R1(config-if)#ip address 192.168.0.1 255.255.255.0
```

Po ustawieniu adresu nie ma jeszcze komunikacji między urządzeniami w sieci, ponieważ protokół linii Ethernet0/0 jest wyłączony.

Włączanie protokołu linii

```
R1(config)#in e0/0
R1(config-if)#no shutdown
```

Router R1 został pomyślnie skonfigurowany i może komunikować się z innymi urządzeniami w sieci poprzez protokół ipv4.

— Końcowa konfiguracja routera R1 —

```
R1#show interface e0/0
Ethernet0/0 is up, line protocol is up
  Hardware is AmdP2, address is cc02.1a35.0000 (bia cc02.1a35.0000)
  Internet address is 192.168.0.1/24
  MTU 1500 bytes, BW 10000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:03, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
    6 packets output, 1185 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

2.2 Konfiguracja routera R2

Po połączeniu z routerem R2, ipv4 address routera nie jest ustawiony.

Output

```
R2#show interface
Ethernet0/0 is administratively down, line protocol is down
  Hardware is AmdP2, address is cc03.1a35.0000 (bia cc03.1a35.0000)
  MTU 1500 bytes, BW 10000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
      Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
```

By ustawić ipv4 wchodzimy w tryb konfiguracji i ustawiamy ipv4 adres.

Output

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface Ethernet 0/0
R2(config-if)#ip address 192.168.0.2 255.255.255.0
R2(config-if)#exit
R2(config)#^Z
R2#
*Mar  1 00:05:08.023: %SYS-5-CONFIG_I: Configured from console by console
```

Adres ipv4 routera R2 zostaje ustawiony na 192.168.0.2 z maską 255.255.255.0.

Output

```
R2#show interfaces
Ethernet0/0 is administratively down, line protocol is down
  Hardware is AmdP2, address is cc03.1a35.0000 (bia cc03.1a35.0000)
  Internet address is 192.168.0.2/24
  MTU 1500 bytes, BW 10000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
```

Pozostaje nam jeszcze ustawić *line protocol* na *up* przy pomocy *no shutdown*. W tym celu ponownie otwieramy tryb konfiguracji.

Output

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface Ethernet 0/0
R2(config-if)#no shutdown
R2(config-if)#
*Mar  1 00:06:10.539: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to
↪ up
*Mar  1 00:06:11.539: %LINEPROTO-5-UPDOWN: Line protocol on Interface
↪ Ethernet0/0, changed state to up
```

```
R2(config-if)#exit
R2(config)#^Z
R2#
*Mar  1 00:06:19.503: %SYS-5-CONFIG_I: Configured from console by console
```

R2 jest gotowy do łączenia z R1 przez Ethernet 0/0.

```
----- Output -----
R2#show interface Ethernet 0/0
Ethernet0/0 is up, line protocol is up
  Hardware is AmdP2, address is cc03.1a35.0000 (bia cc03.1a35.0000)
  Internet address is 192.168.0.2/24
  MTU 1500 bytes, BW 10000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
    9 packets output, 1365 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
```

2.3 Połączenie między routerami

Powyższa konfiguracja pozwala na komunikację między routerami R1 i R2.

Próba komunikacji R2 z R1

```
R2#ping 192.168.0.1
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 192.168.0.1, timeout is 2 seconds:
```

```
!!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/24/28 ms
```

Próba komunikacji R1 z R2

```
R1#ping 192.168.0.2
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 192.168.0.2, timeout is 2 seconds:
```

```
!!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 24/28/36 ms
```

3 Konfiguracja ipv6

3.1 Konfiguracja routera R1

W celu skonfigurowania komunikacji przez protokół ipv6 należy wyłączyć protokół ipv4 oraz włączyć ipv6.

Przełączanie na ipv6

```
R1(config)#in e0/0
```

```
R1(config-if)#no ip address
```

```
R1(config-if)#ipv6 unicast-routing
```

```
R1(config)#in e0/0
```

```
R1(config-if)#ipv6 enable
```

Należy także ustawić odpowiedni adres ipv6 dla routera R1.

Ustawianie adresu ipv6 dla R1

```
R1(config)#in e0/0
R1(config-if)#ipv6 address 2001:DB8:0:1::2/64
```

Router R1 został pomyślnie skonfigurowany i może komunikować się z innymi urządzeniami w sieci poprzez protokół ipv6.

3.2 Konfiguracja routera R2

By skonfigurować R2 pod użycie ipv6 wchodzimy w tryb konfiguracji i ustawiamy ipv6 adres.

Output

```
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface Ethernet 0/0
R2(config-if)#ipv6 address
% Incomplete command.

R2(config-if)#ipv6 address 2001:DB8:0:1::1/64
R2(config-if)#ipv6 enable
R2(config-if)#exit
R2(config)#^Z
R2#
*Mar  1 00:13:15.983: %SYS-5-CONFIG_I: Configured from console by console
```

R2 znajduje się pod adresem 2001:DB8:0:1::1.

Output

```
R2#show ipv6 interface
Ethernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::CE03:1AFF:FE35:0
  Global unicast address(es):
    2001:DB8:0:1::1, subnet is 2001:DB8:0:1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:1
    FF02::1:FF35:0
```

```
MTU is 1500 bytes
ICMP error messages limited to one every 100 milliseconds
ICMP redirects are enabled
ND DAD is enabled, number of DAD attempts: 1
ND reachable time is 30000 milliseconds
```

Usuwamy ustawiony wcześniej ipv4 adres, dodajemy unicast routing.

Output

```
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface Ethernet 0/0
R2(config-if)#no ip address
R2(config-if)#exit
R2(config)#^Z
```

Output

```
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface Ethernet 0/0
R2(config-if)#ipv6 unicast-routing
R2(config)#exit
R2#
*Mar  1 00:17:24.611: %SYS-5-CONFIG_I: Configured from console by console
```

R2 jest gotowy do łączenia przez Ethernet 0/0 korzystając z ipv6.

Output

```
R2#show ipv6 interface
Ethernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::CE03:1AFF:FE35:0
  Global unicast address(es):
    2001:DB8:0:1::1, subnet is 2001:DB8:0:1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:1
    FF02::1:FF35:0
```



```
MTU is 1500 bytes
ICMP error messages limited to one every 100 milliseconds
ICMP redirects are enabled
ND DAD is enabled, number of DAD attempts: 1
ND reachable time is 30000 milliseconds
ND advertised reachable time is 0 milliseconds
ND advertised retransmit interval is 0 milliseconds
ND router advertisements are sent every 200 seconds
ND router advertisements live for 1800 seconds
Hosts use stateless autoconfig for addresses.
```

3.3 Połączenie między routerami

Powyższa konfiguracja pozwala na komunikację między routerami R1 i R2.

Próba komunikacji R2 z R1

```
R2#ping ipv6 2001:DB8:0:1::2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:0:1::2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/20/28 ms
```

Próba komunikacji R1 z R2

```
R1#ping 2001:DB8:0:1::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:0:1::1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/29/56 ms
```