

**POLITECHNIKA LUBELSKA**  
**WYDZIAŁ ELEKTROTECHNIKI I INFORMATYKI**



**LABORATORIUM SIECI ROZPROSZONYCH**

**Ćw 1: Podstawy pracy w routerami firmy CISCO**

prowadzący:  
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1d: znakiem zachęty w trybie user mode jest znak większości.

1e: w trybie użytkownika.

```
Router>?
Exec commands:
<1-1>
access-enable      Slot Number
                   Create a temporary Access-List entry
access-profile     Apply user-profile to interface
clear              Reset functions
connect            Open a terminal connection
crypto             Encryption related commands.
disable            Turn off privileged commands
disconnect         Disconnect an existing network connection
do-exec            Mode-independent "do-exec" prefix support
emm               Run a configured Menu System
enable             Turn on privileged commands
ethernet           Ethernet parameters
exit               Exit from the EXEC
help               Description of the interactive help system
hu-module          Hardware module level specific operations
lock               Lock the terminal
login              Log in as a particular user
logout             Exit from the EXEC
modemui            Start a modem-like user interface
mrinfo            Request neighbor and version information from a multicast
                  router
mstat              Show statistics after multiple multicast traceroutes
--More--
```

2b: clear, connect, login, disable, help, exit, logout, disconnect

```
Router>enable
Router#
```

3b: zamiast znaku większości pojawił się znak hash #.

```
Router>enable
Router#?
Exec commands:
<1-1>
access-enable      Slot Number
                   Create a temporary Access-List entry
access-profile     Apply user-profile to interface
access-template    Create a temporary Access-List entry
archive            manage archive files
auto               Exec level Automation
beep               Blocks Extensible Exchange Protocol commands
bfe                For manual emergency modes setting
bulkstat           Bulkstat exec commands
calendar           Manage the hardware calendar
call-home          Call-Home commands
cd                 Change current directory
clear              Reset functions
clock              Manage the system clock
cns                CNS agents
configure          Enter configuration mode
connect            Open a terminal connection
copy               Copy from one file to another
crypto             Encryption related commands.
cts                Cisco Trusted Security Exec Commands
debug              Debugging functions (see also 'undebug')
delete             Delete a file
--More--
```

4b: archive, beep, clear, configure, copy, debug, delete, calendar, cts, bfe. W trybie uprzywilejowanym użytkownik ma dostęp do większej ilości poleceń.

```

Router#disable
Router>show ?
  aaa                Show AAA values
  adjacency          Adjacent nodes
  arp                ARP table
  auto               Show Automation Template
  autoupgrade        Show autoupgrade related information
  backup             Backup status
  bcm560x            BCM560x HW Table
  bgp                BGP information
  cache              Shows Device-Sensor Cache Informations
  calendar            Display the hardware calendar
  call               Show call
  call-home           Show command for call home
  caller             Display information about dialup connections
  capability          Capability Information
  cca                CCA information
  cdapi              CDAPI information
  class-map           Show CPL Class Map
  clock              Display the system clock
  cns                CNS agents
  compress            Show compression statistics
  connection          Show Connection
  context             Show context information about recent crash(s)
--More--

```

```

Router#show ?
  aaa                Show AAA values
  access-expression  List access expression
  access-lists       List access lists
  adjacency          Adjacent nodes
  aliases            Display alias commands
  alignment           Show alignment information
  application         Application Routing
  archive            Archive functions
  arp                ARP table
  async              Information on terminal lines used as router
                    interfaces
  authentication      Shows Auth Manager registrations or sessions
  auto               Show Automation Template
  autoupgrade        Show autoupgrade related information
  backhaul-session-manager Backhaul Session Manager information
  backup             Backup status
  bcm560x            BCM560x HW Table
  beep              Show BEEP information
  bgp                BGP information
  bridge             Bridge Forwarding/Filtering Database [verbose]
  buffers            Buffer pool statistics
  bulkstat           Bulkstat show commands
--More--

```

6c: w trybie uprzywilejowanym użytkownik ma dostęp do większej ilości poleceń.

```

Router>enable
Router#show version
Cisco IOS Software, C2900 Software (C2900-UNIVERSALK9-M), Version 15.3(3)M5, RELEASE SOFTWARE (fc3)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2015 by Cisco Systems, Inc.
Compiled Wed 04-Feb-15 09:02 by prod_rel_team

ROM: System Bootstrap, Version 15.0(1r)M16, RELEASE SOFTWARE (fc1)

Router uptime is 34 minutes
System returned to ROM by power-on
System image file is "flash0:c2900-universalk9-mz.SPA.153-3.M5.bin"
Last reload type: Normal Reload
Last reload reason: power-on

This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
--More--

```

show version pokazuje informacje o hardware i software systemu.

```
Router#show running-config
Building configuration...

Current configuration : 1136 bytes
!
version 15.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
boot-start-marker
boot-end-marker
!
!
no aaa new-model
```

`show running-config` pozwala wyświetlić informację o dostępnych interfejsach.

```
Router#show stacks
Minimum process stacks:
Free/Size   Name
5264/6000   CDP BLOB
8236/9000   EM ED GOLD
10984/12000 MRIB IPv4 Init Process
11248/12000 MRIB IPv6 Init Process
3704/6000   EEM Shell Director
1616/6000   Call Home DSFileUp
1608/3000   Rom Random Update Process
5176/6000   URPF stats
5228/6000   SPAN Subsystem
58712/60000 EEM Auto Registration Proc
5116/6000   Auto Upgrade Startup Process
4676/6000   DIB error message
5260/6000   SASL MAIN
5024/6000   LICENSE AGENT DEFAULT
8264/9000   cdp init process
18040/24000 main-thread
5032/6000   RADIUS INITCONFIG
5260/6000   platform_reclaim_men

Interrupt level stacks:
Level   Called Unused/Size   Name
--More--
```

show stacks służy do monitorowania procesów i procedur przerwania.

```
Router#show startup-config
Using 1330 out of 262136 bytes
!
! Last configuration change at 11:20:54 UTC Mon Apr 10 2017
version 15.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
boot-start-marker
boot-end-marker
!
!
!
no aaa new-model
!
!
!
!
!
!
--More--
```

show startup-config wyświetla konfigurację startową.

```
Router#show buffers
Buffer elements:
  1660 in free list
  598 hits, 0 misses, 1242 created

Public buffer pools:
Small buffers, 104 bytes (total 62, permanent 50, peak 62 @ 00:30:14):
  60 in free list (20 min, 150 max allowed)
  45 hits, 4 misses, 0 trims, 12 created
  0 failures (0 no memory)
Middle buffers, 600 bytes (total 40, permanent 25, peak 40 @ 00:30:14):
  40 in free list (10 min, 150 max allowed)
  46 hits, 5 misses, 0 trims, 15 created
  0 failures (0 no memory)
Big buffers, 1536 bytes (total 51, permanent 50, peak 51 @ 00:41:15):
  51 in free list (5 min, 150 max allowed)
  29 hits, 0 misses, 0 trims, 1 created
  0 failures (0 no memory)
VeryBig buffers, 4520 bytes (total 11, permanent 10, peak 11 @ 00:41:15):
  11 in free list (0 min, 100 max allowed)
  0 hits, 0 misses, 0 trims, 1 created
  0 failures (0 no memory)
Large buffers, 5024 bytes (total 1, permanent 0, peak 1 @ 00:41:38):
  1 in free list (0 min, 10 max allowed)

Router#
```

show buffers wyświetla informacje o buforach.

```
Router#show memory
Head      Total(b)    Used(b)    Free(b)    Lowest(b)  Largest(b)

I/O memory

Address    Bytes    Prev    Next    Ref    PrevF    NextF    Alloc PC    what
00800000  0000040944  00000000  0080A020  000    38B87714  0      332AD580    (fragment)
0080A020  0000000128  00800000  0080A000  001    -----  -----  303310E0    *Init*
0080A000  0000010448  0080A020  0080C900  001    -----  -----  332B36C8    *Init*
0080C900  0000524368  0080A000  0088CA50  001    -----  -----  30337380    HQE Buffer Pool
0088CA50  0000524368  0080C900  0090CA00  001    -----  -----  303373CC    CF DMA pool
0090CA00  0000065616  0088CA50  0091CB50  001    -----  -----  303371FC    Command Buffer Pool
0091CB50  0000786512  0090CA00  0090CB00  001    -----  -----  30337078    Gather List Buffer Pool
0090CB00  0000008272  0091CB50  0090EC50  001    -----  -----  30331DA8    *Init*
0090EC50  0000000080  0090CB00  0090EC00  001    -----  -----  30331DFC    *Init*
0090EC00  0000008272  0090EC50  009E0050  001    -----  -----  30331DA8    *Init*
009E0050  0000000080  0090EC00  009E0000  001    -----  -----  303310E0    *Init*
009E0000  0000000080  009E0050  009E010C  001    -----  -----  30331DFC    *Init*
009E010C  0000008272  009E0000  009E2E00  001    -----  -----  30331DA8    *Init*

Router#
```

show memory wyświetla szczegółowe informacje o pamięci.

```

Router#show protocols
Global values:
  Internet Protocol routing is enabled
Embedded-Service-Engine0/0 is administratively down, line protocol is down
GigabitEthernet0/0 is administratively down, line protocol is down
GigabitEthernet0/1 is administratively down, line protocol is down
GigabitEthernet0/2 is administratively down, line protocol is down
Serial0/0/0 is administratively down, line protocol is down
Serial0/0/1 is administratively down, line protocol is down
Router#

```

show protocols wyświetla skonfigurowane protokoły.

```

Router#show flash
#- --length-- -----date/time----- path
--More--

```

Show flash wyświetla układ (layout) pamięci flash systemu.

6e:

wersja systemu: 15.3(3)M5

nazwa pliku z obrazem systemu: flash0:c2900-universalk9-mz.SPA.153-3.M5.bin (o ile nie popełniłem literówki)

```

Router#show interfaces
Embedded-Service-Engine0/0 is administratively down, line protocol is down
  Hardware is Embedded Service Engine, address is 0000.0000.0000 (bia 0000.0000.0000)
  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: 0/64/0/0 (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 IP multicasts)
    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

```

7a: MTU(m)

interfejs bez

7b: zastosow

7c: wpisując

```

Router#show interfaces
Embedded-Service-Engine0/0 is administratively down, line protocol is down
  Hardware is Embedded Service Engine, address is 0000.0000.0000 (bia 0000.0000.0000)
  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
  % Unknown command or computer name, or unable to find computer address
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/2
Router(config-if)#ip address 10.0.0.1 255.255.255.0
Router(config-if)#description TEST
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#^Z
Router#
*Oct 10 18:22:54.131: XSYS-5-CONFIG_I: Configured from console by console
  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
  0 output buffer failures, 0 output buffers swapped out

```

zyc dany

```

0 output buffer failures, 0 output buffers swapped out
GigabitEthernet0/2 is up, line protocol is up
Hardware is CN Gigabit Ethernet, address is f872.eab1.d082 (bia f872.eab1.d082)
Description: TEST
Internet address is 10.0.0.1/24
MTU 1500 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
Full Duplex, 1Gbps, media type is RJ45
output flow-control is XON, input flow-control is XON
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:04, output 00:00:09, 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
    70 packets input, 12220 bytes, 0 no buffer
Received 59 broadcasts (0 IP multicasts)
    0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 0 multicast, 0 pause input
    42 packets output, 4805 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 pause output
    0 output buffer failures, 0 output buffers swapped out
Serial0/0/0 is administratively down, line protocol is down

```

9 a: **interface gigabitethernet** x/y, gdzie przed ukośnikiem podajemy numer slotu, a po ukośniku numer portu dla interfejsu Gigabit Ethernet

9b:

Data Communications Equipment (DCE) – urządzenie komunikacyjne, które przesyła dane przez pętlę lokalną i umożliwia urządzeniom DTE dostęp do łącz telekomunikacyjnych, np. modem.

Data Terminal Equipment (DTE) – urządzenie końcowe klienta stanowiące źródło lub miejsce przeznaczenia danych.