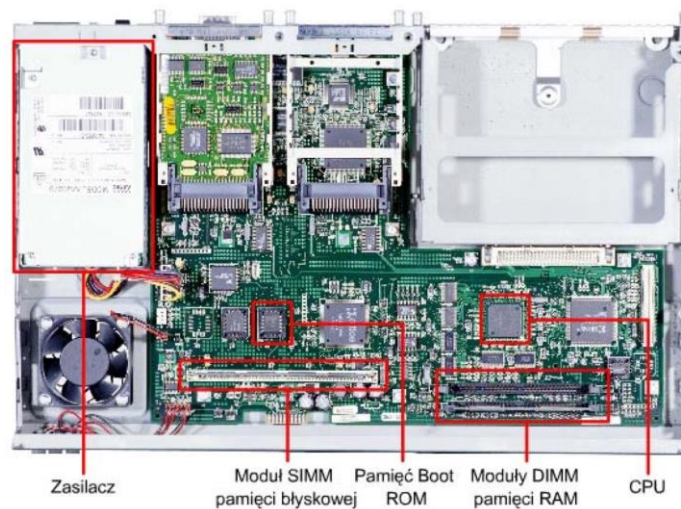


IP Net LAB 1

CISCO ROUTER'S CONFIGURATION BASICS

According to the preliminary schedule, the router is a specialized computer. Its construction (see figure below) as well as the operation has a lot of common elements PC Unix / Linux operating systems.



The correct configuration and use of a router requires the knowledge of its core components such as memory and interfaces.

Memory usage on the router

RAM:

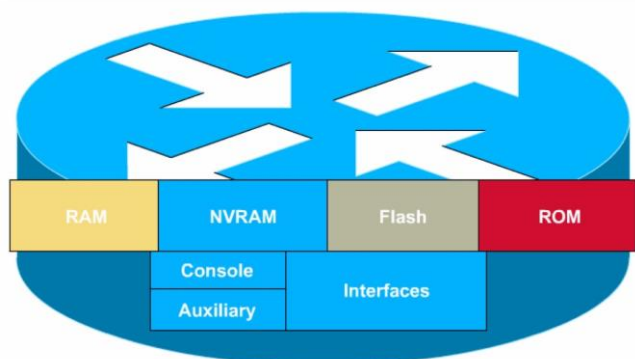
- Tables and buffers (routing tables, ARP tables, buffers);
- The current configuration file;
- Operating system.

NVRAM:

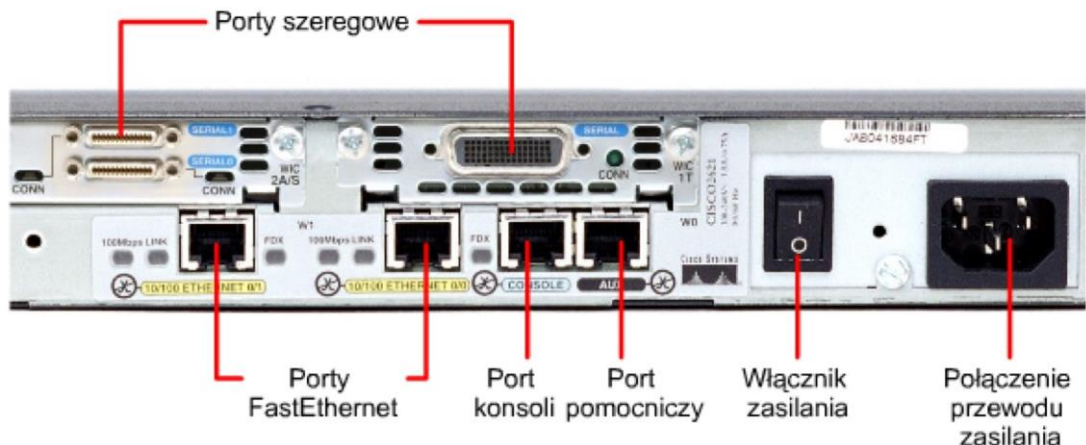
- Start configuration files;
- Copies of configuration files. Flash memory;
- The image of the operating system.

ROM:

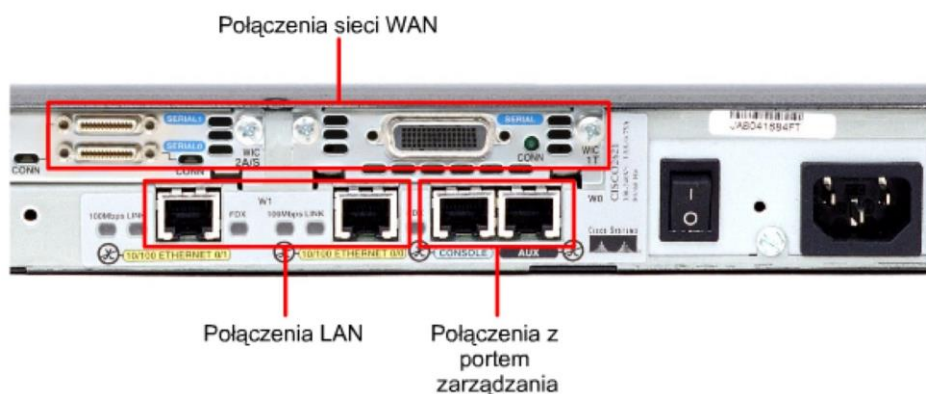
- Boot programs;
- Diagnostic functions;
- Operating system.



Router's interfaces



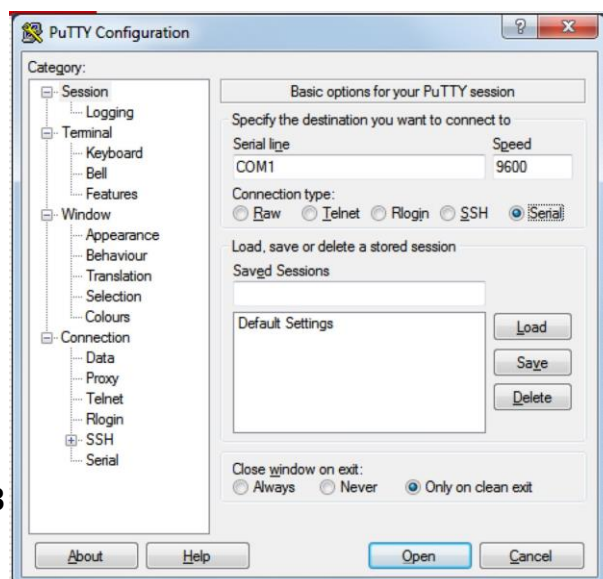
All connection types was discussed during organizational class. It is notable, that in practice **Serial** interfaces are used for the implementation of WAN connections (eg. between routers) and **Ethernet** interfaces for connecting LAN (during laboratory or individual hosts). **Console** interface is used for serial connection to the host. This connection allows full configuration of the device.



Serial router connection

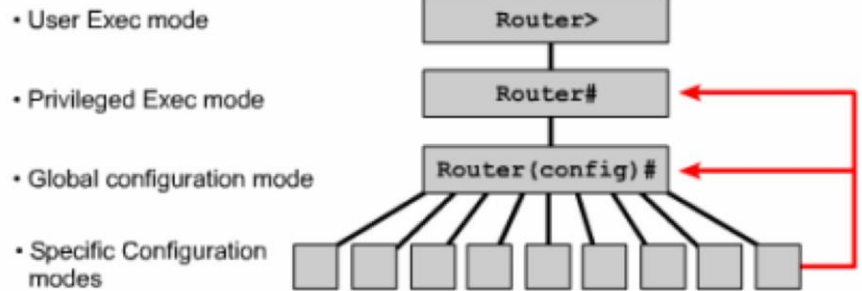
The user gets access to the operating system of the router through remote login using terminal software. Communication with the PC is done via the RS 232 (this option will be used during laboratory exercises) or USB. In the case of RS-232 function terminal can provide programs such as Minicom (Linux), Hyper Terminal (Windows XP, Windows Vista, 7 and 8 - trial version and paid) or Putty (free program available on all OS platforms). During the exercise will be used the latter program. Setup can be downloaded from www.putty.org.

The transmission parameters to be set when compiling the serial port Console router is: **9600, 8 data bits, no parity, and 1 stop bit.**



Router working modes

After logging in, there are three basic modes of operation and configuration modes in detail. The drawing on the right illustrates the router modes.



User mode

Command prompt: Router>

Switching to the mode: Available directly after connecting the console.

Leaving the mode: Commands: [exit](#), [logout](#).

The use: Access to basic information about the router.

Privileged mode

Command prompt: Router#

Switching to the mode: Command [enable](#) in user mode.

Leaving the mode: Commands: [disable](#), [exit](#), [logout](#).

The use: Detailed information about the router, access the configuration mode.

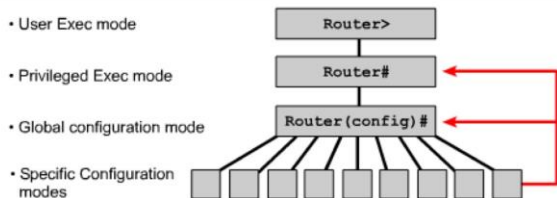
Global configuration mode

Command prompt: Router(config)#

Switching to the mode: Command [configure terminal](#) in privileged mode

Leaving the mode: Commands: [exit](#), [end](#), [Ctrl+Z](#).

The use: Configuring the global router settings.



Specific configuration mode

Command prompt: Router(config-if)#

Switching to the mode: The command depends on what you will configure, eg.: [interface FastEthernet 0/0](#)

Leaving the mode: Commands: [exit](#). The use:

To configure the detailed settings of the router components.

Configuration Mode	Prompt
Interface	Router(config-if)#
Subinterface	Router(config-subif)#
Controller	Router(config-controller)#
Map-list	Router(config-map-list)#
Map-class	Router(config-map-class)#
Line	Router(config-line)#
Router	Router(config-router)#
IPX-router	Router(config-ipx-router)#
Route-map	Router(config-route-map)#

The command line resembles the Linux bash. Commands can supplement the tabs.

The list of available commands depending on the current mode is achieved by "?".

Editing functions:

Ctrl + A Move to the beginning of the command line

Ctrl + E Move to the end of the command line

Esc + B One word back

Ctrl + F | → Move single character forward
Ctrl + B | ← Move single character back
Esc + F Move single word forward

THE COURSE OF THE EXERCISE

NOTE: The report must set out all the elements (questions, commands) highlighted in red.

1. Router logging (Putty)

- a. Run the program Putty session and enter the above-mentioned transmission parameters for the serial link
- b. Log in to the router. On the question of entry into the mode setup answer no (no). At the password prompt answer (password is given by instructor).
- c. The word "router" is the default setting. If the router has been given a name, you may get another word. *UWAGA: The router should be given a unique name. The setting name is one of the first tasks of the router configuration. This is done in global configuration mode (global configuration mode)*
- d. What prompt is displayed by the router? Router>
- e. In what mode the user is logged in? User Exec

2. Using help functions

- a. Access the help system by typing ? after the command prompt of user mode *Router>?*
- b. Type the eight available commands displayed by the router.
<1-99> Session number to resume

connect Open a terminal connection

disable Turn off privileged commands

disconnect Disconnect an existing network connection

3. Enabling privileged EXEC mode

- a. Move to the privileged mode by entering the enable command. In the case of display questions for password entry (*password given by the instructor*).
Router>enable [Enter]

b. How changed the command prompt and what does it mean?

'Router>' changed to the 'Router#' and its means now we are in Privilege Mode and we can able to change the router configuration

4. Using help

- a. . Go to the help mode by typing a question mark (?) after command prompt in privileged EXEC mode *Router# ?*

NOTE: The screen displays 22 lines simultaneously. If there are more lines, symbol --More— will be visible. Pressing the Enter will shift by one row. Pressing the spacebar move on the next screen.

- b. **Write down ten (10) available commands displayed by the router.**

access-enable 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

5. Using command line history function

- a. **Use *show history*, to display the contents of the command buffer. Write down the output of this command.**

show _ /n configuration /n show /n show history

- b. Press the up arrow key or key combination Ctrl + P to display the last command issued. Press it again to go to an earlier command. Press the down arrow key or key combination Ctrl + N to move in the opposite direction.

NOTE: To set the buffer size command uses the command *terminal history size 256* where 256 is the number of commands. The default number is 10 commands.

The maximum number of commands is 256.

Other useful commands are:

Disabling the command history: *terminal no history*

Enabling the command history: *terminal history*

Automatic completion of commands started or attribute: TAB

6. Command show

Command *show* contains a number of commands that can be used to check the contents of files in the router and to detect the causes of incorrect operation of the router

Command `show ?` provides a list of available commands in both privileged EXEC and privileged user EXEC mode.

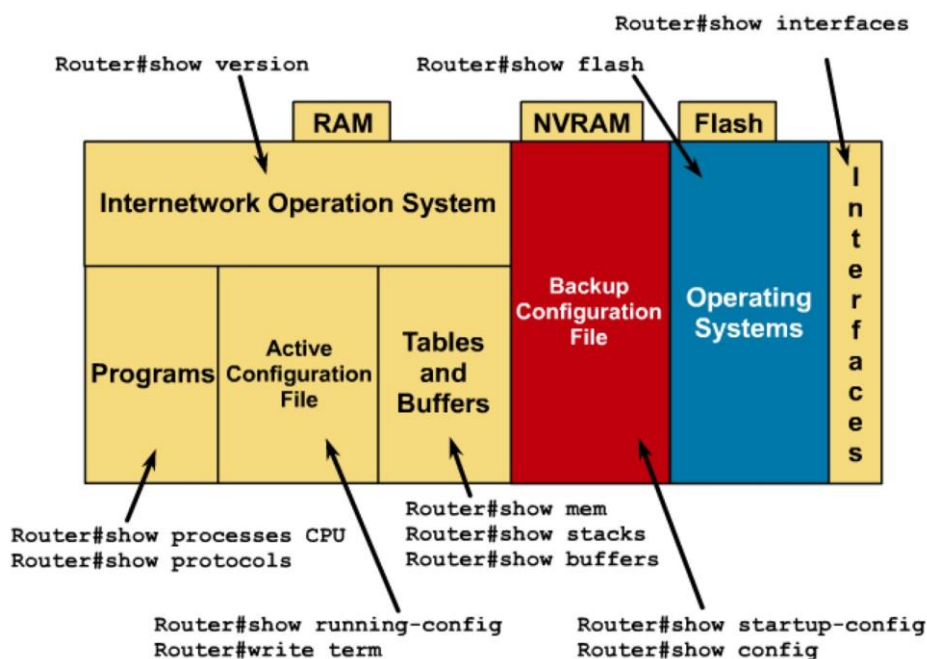
- In the user EXEC mode, enter the command `show ?`. The router will display all varieties show commands available in the user mode.
- From the user EXEC mode, go into the privileged EXEC mode using the **enable** command. At the command prompt, type the router `show ?`.
- Describe using at least 3 sentences what is the difference between answer from the data displayed in user EXEC mode

aliases Display alias commands

alignment Show alignment information

archive Archive functions

The Command group show allow quick understanding of hardware and current configuration of the router. This is illustrated in the figure below.



- Test the effect of the following commands, and for each of them give a description of what it is for (what information provides):

- show version

ROM: System Bootstrap, Version 15.0(1r)M15, RELEASE SOFTWARE (fc1) : its provides routers firmware version that on running

- show processes

its provides the on running process list

- show protocols
shows the status of internet protocol routing

- show memory
shows the routers memory table

- show stacks
shows the routers stack status (how much is allocated and how much is free)

- show buffers
shows the routers buffer status

- show flash
shows the files that on the flash memory

- show running-config
shows the currently active configuration and its size

- show startup-config
shows the permanent configuration

- show interfaces
shows the routers interface status

e. Based on the previous point please answer the following questions:

- What is the version of the system IOS?
Version 15.1(4)M4

- What is the name of the file system image (IOS)?
"flash0:c2900-universalk9-mz.SPA.151-4.M4.bin"

- Enter the type of processor (CPU) and size of RAM.
Cisco CISCO2911/K9 (revision 1.0) with 483328K/40960K bytes of memory.

- What is the number of Ethernet interfaces, built into the router? 3 What is the number of serial interfaces? 2

- Backup router configuration file is stored in non-volatile random access memory (NVRAM). In that amount of NVRAM is router equipped with?

255K bytes of non-volatile configuration memory.

- Router Operating System (IOS) is stored in flash memory. What amount of flash memory router is equipped with?

250880K bytes of ATA System CompactFlash

7. Displaying interfaces information.

a. At the router command prompt, type: *show interfaces*. Find the the following information about the Fast Ethernet interface and explain their meaning.

- What MTU means? Maximum Transmission Unit : largest size of packet that can be sent
- What does “load” mean in this context? Basically traffic. Its shows the percent of how many resources used

b. Find the information about the type of encapsulation on the interface Serial: *What kind of encapsulation was used in the data-link layer?* PPP, Frame Relay, Ethernet Protocol

c. At the router’s command prompt, type *show protocols*. *What important information is displayed?*

Its displayed which protocol is up and running and which protocol down.

8. Configuring Ethernet network interfaces. Connecting router to a PC.

Information regarding the connection of network interfaces PCs and network devices have been discussed during initial class. Under this exercise point realize connection: PC – router via Ethernet interface.

Ethernet interface configuration:

a. Enter the global configuration mode using command:

Router# configure terminal

b. Enter the interface configuration mode with the command: *Command Syntax: interface <interface type> <interface number>* interface type is the type of communication interface: serial, Ethernet, Fast Ethernet, token ring. eg.

Router(config)# interface FastEthernet 0/0

c. Assign the address and subnet mask for the configured interface: *Syntax: router(config)# ip address <ip address > <netmask >* eg. *Router(config-if)# ip address 10.0.0.1 255.255.255.0*

d. Run the interface using: *Router(config-if)# no shutdown*

e. Exit the configuration interface for the global configuration menu *Router(config-if)# exit*

NOTE: The command for administratively shutdown interface: Router(config-if)# shutdown

f. Configuration of the interface descriptive name is not always be used but is useful when it is important to identify the important information associated with that interface, eg. name of the remote router, the number of the communication link or the name of a specific network segment. The configuration of this type is performed by entering the command syntax: `description <interface name>` for example.:

Router(config)# interface FastEthernet 0/0

Router(config-if)#description TEST

g. In the report, please put the result of the competent command of the show commands family, showing the parameters configured with the Ethernet interface given its name.

9. TASKS FOR SELF-STUDY

9.1 There is interface number in the syntax of network interfaces configuring command. It may contain from one to three values separated by a slash. Please explain what is the principle applied when assigning the number of interfaces in Cisco routers.

9.2 Explain what the abbreviation DTE and DCE. What is the role DTE and DCE in series?

REPORT SHOULD BE IN PLACE IN THE CATALOGUE Dropbox / Lab / Reports / <DayOfWeek.time of start of classes>

FILE REPORTS PLEASE call BY SCHEME:

Spr1_ <name of student performing statements> .pdf

PREFERRED FILE FORMAT: PDF

Answers

9.1) Its because of the Cisco's naming convention for interfaces. Number values are mostly limited by physical slots of router. And it depends on the router's type and model. Also provides modularity and flexibility.

9.2) DTE stands for Data Terminal Equipment and DCE stands for Data Communications Equipment. DCE's provides a clock cycle for DTE's. DCE devices are modem etc. DTE devices are mostly end-user devices. In routers serial ports can be a either.WAN connections can be simulate with using this feature.

Nuri Melih Sensoy