

IOS

Cisco Internetworking Operating System



Pristup sviču ili ruteru

Pristup sviču ili ruteru je moguć:

- Direktno preko konzolnog porta (Console port) na uređaju
 - Nije potrebno konfigurisati ruter za ovaj pristup
- Telnet – preko mreže
 - Mrežna konekcija
 - Mrežna konfiguracija na oba kraja (IP, Subnet,..)
 - Telnet lozinka (Password) konfigurisana na ruteru
- Modemski



Pristup sviču ili ruteru

Direktan pristup sviču ili ruteru:

- Konzolni port na ruteru ili sviču omogućava povezivanje “dumb” terminala ili direktno povezivanje računara sa terminal – emulatorskim softverom
- Na ruteru nisu potrebne nikakve IP adrese ni bilo kakva druga konfiguraciona podešavanja
- Upotrebljava se Rollover kabl
- Koristi se za:
 - Configuring a device that has never been configured,
 - Config a device directly, because you are physically located where the device is,
 - Troubleshooting a device that you can no longer access remotely,
 - Performing password recovery



Podizanje rutera ili sviča – bez konfiguracije

Ako ruter nema sačuvanu konfiguraciju, nakon njegovog podizanja i određenog početnog teksta na ekranu, treba da se vidi sledeće pitanje:

Would you like to enter the initial configuration dialog? [yes/no]*: **n**

- Kucanjem **n** ruteru se šalje odgovor ne, što je standardna procedura.
- Odgovorom **y** ulazi se u **setup mode** rutera. Za izlazak iz setup moda potrebno je koristiti kombinaciju tastera CTRL-C.
- Sačekati par sekundi i pritisnuti ENTER

* - na nekim ruterima moguće su i poruke drukčijeg sadržaja



Podizanje rutera ili sviča – sa konfiguracijom

Ako ruter ima sačuvanu konfiguraciju, nakon njegovog podizanja umesto poruke vidi se odziv na ekranu:

Router>

- Neko je već sačuvao konfiguraciju u ruteru (startup – config),
- Brisanje prethodne konfiguracije i restartovanje rutera vrši se na sledeći način:

Router>**enable ili** skraćeno: **en**

- Ako je potrebno uneti lozinku, ona je obično: **cisco** ili **class**

Router# **erase startup-config**

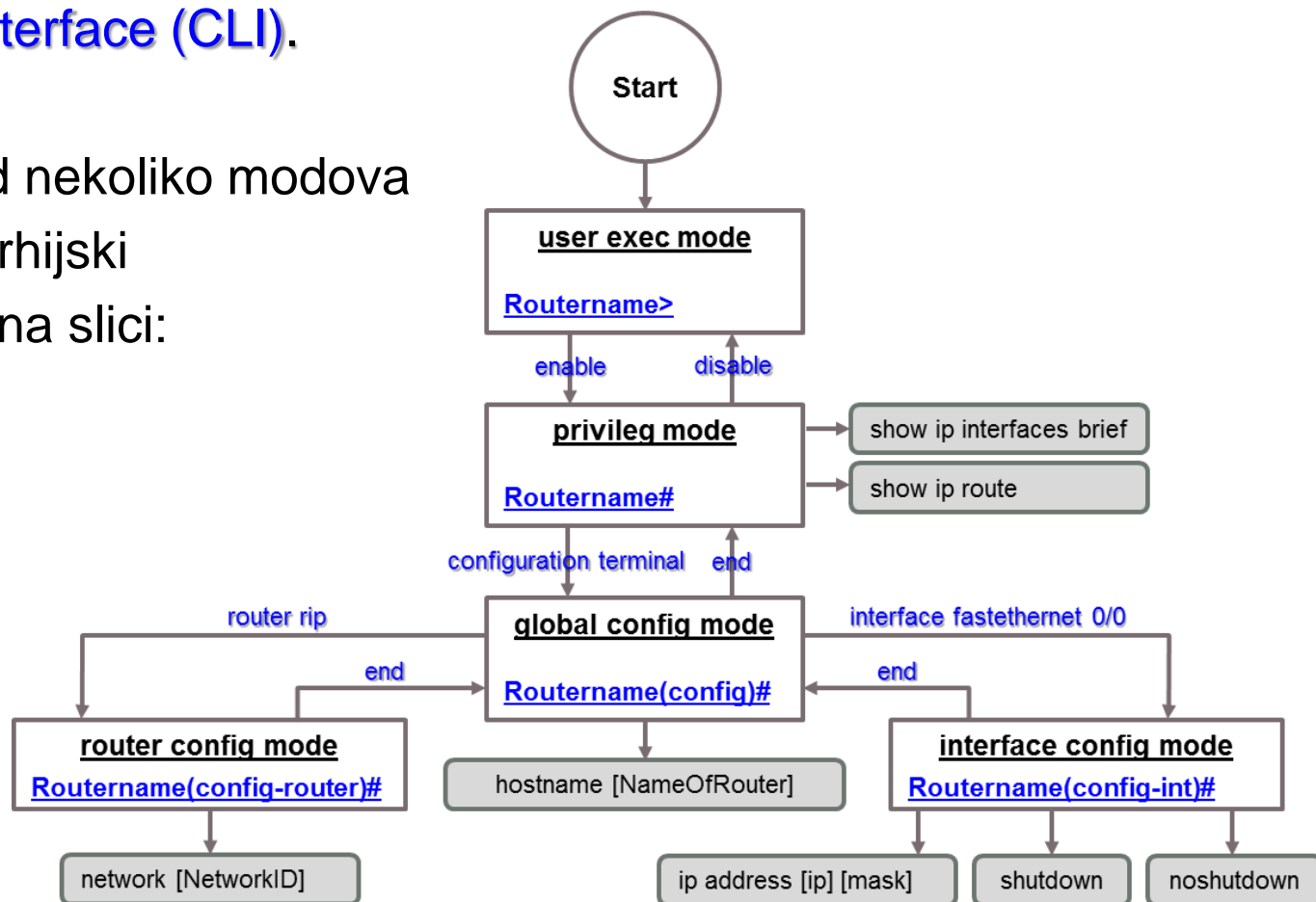
- Zatim isključiti i ponovo uključiti ruter

Cisco IOS Command Line Interface

- Osnovni način konfigurisanja i rada sa Cisco routerima je direktno zadavanje komandi u tekstualnom interfejsu koji se naziva:

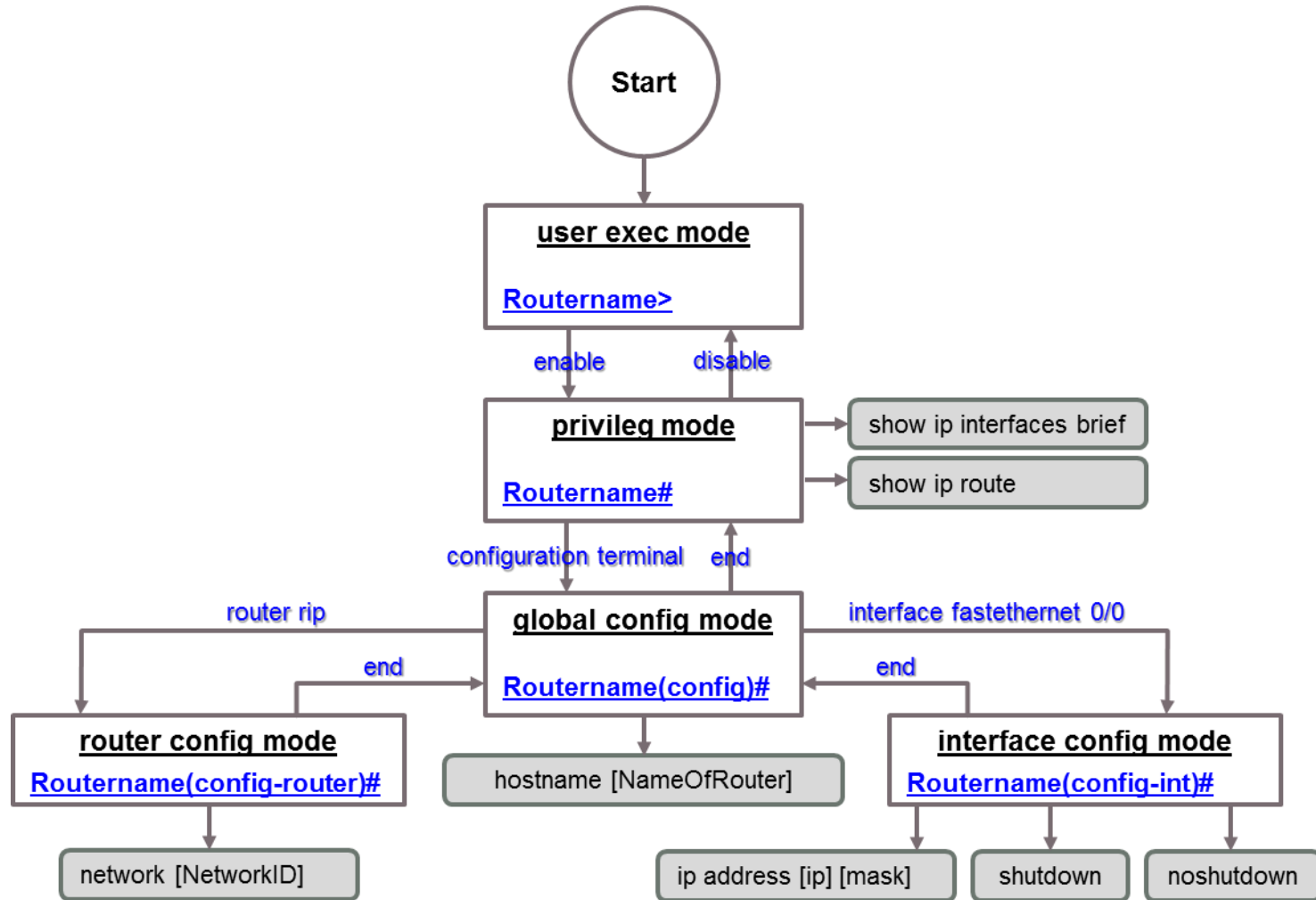
Command Line Interface (CLI).

- CLI se sastoji od nekoliko modova rada koji su hijerarhijski organizovani kao na slici:



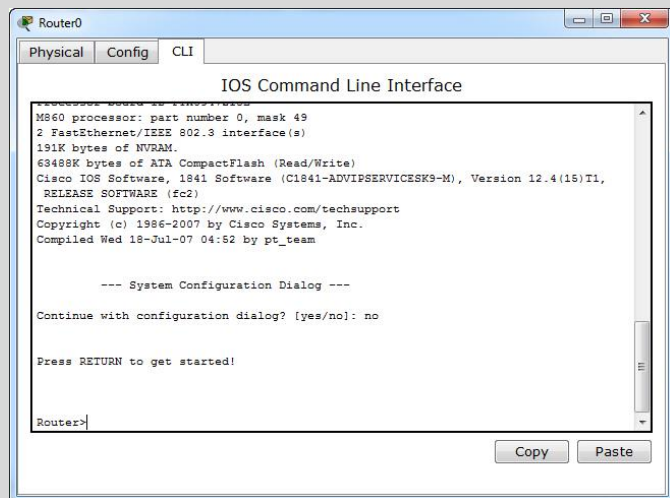


Cisco IOS Command Line Interface



Cisco IOS Command Line Interface

Prikaz user moda rutera



```

Router0
-----
Physical Config CLI
IOS Command Line Interface

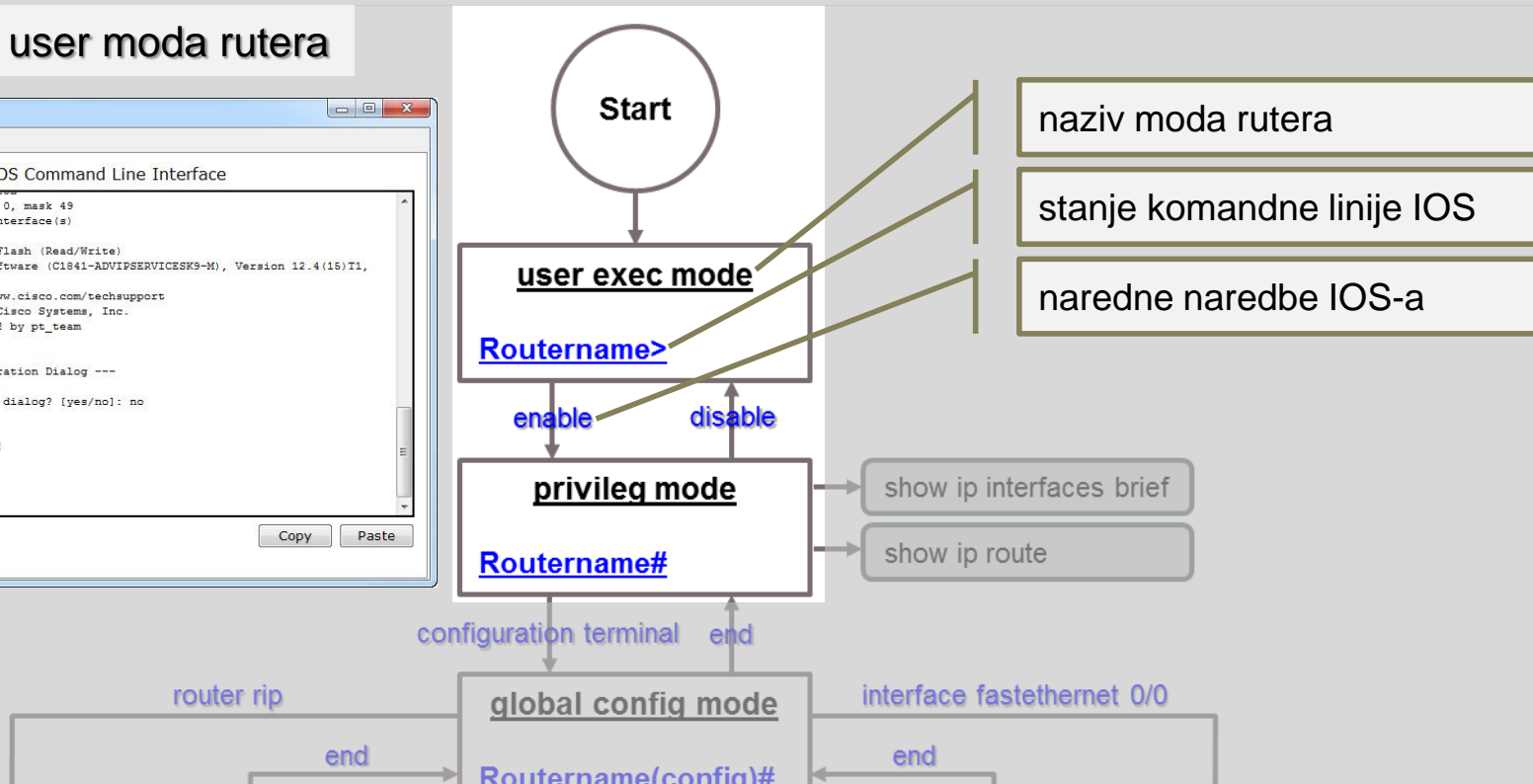
Processor board ID F45678901234567890
M860 processor: part number 0, mask 49
2 FastEthernet/IEEE 802.3 interface(s)
191K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>
  
```



- **User mode** je osnovni mod u kojem je moguće korišćenje komandi kojima se prikazuju samo najosnovnije informacije o radu rutera.
- Komandom **enable** prelazi se u **privileged mode** (ili enable mode), koji je zaštićeni mod u kojem je moguće prikazivanje svih informacija o routeru.
- Komandom **disable** se vraća nazad u user mode.



Cisco IOS Command Line Interface

```

Router1
Physical Config CLI
IOS Command Line Interface
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

Router#show ip interfaces brief
% Invalid input detected at '^' marker.

Router#show ip interfaces
% Invalid input detected at '^' marker.

Router#show ip interface
FastEthernet0/0 is administratively down, line protocol is down (disabled)
Internet protocol processing disabled
FastEthernet0/1 is administratively down, line protocol is down (disabled)
Internet protocol processing disabled
Vlan1 is administratively down, line protocol is down
Internet protocol processing disabled
Router#
    
```

```

Router1
Physical Config CLI
IOS Command Line Interface

--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: no

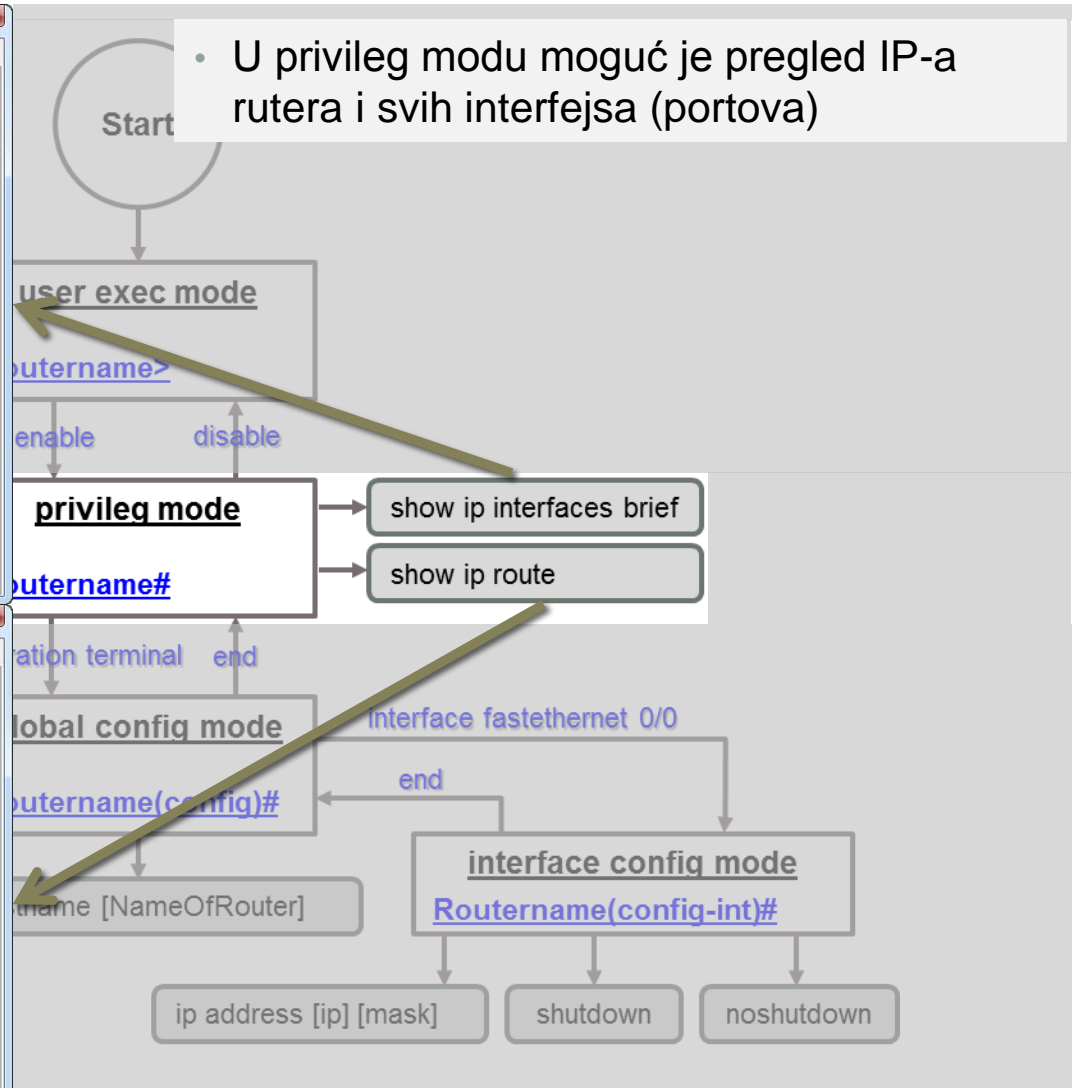
Press RETURN to get started!

Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

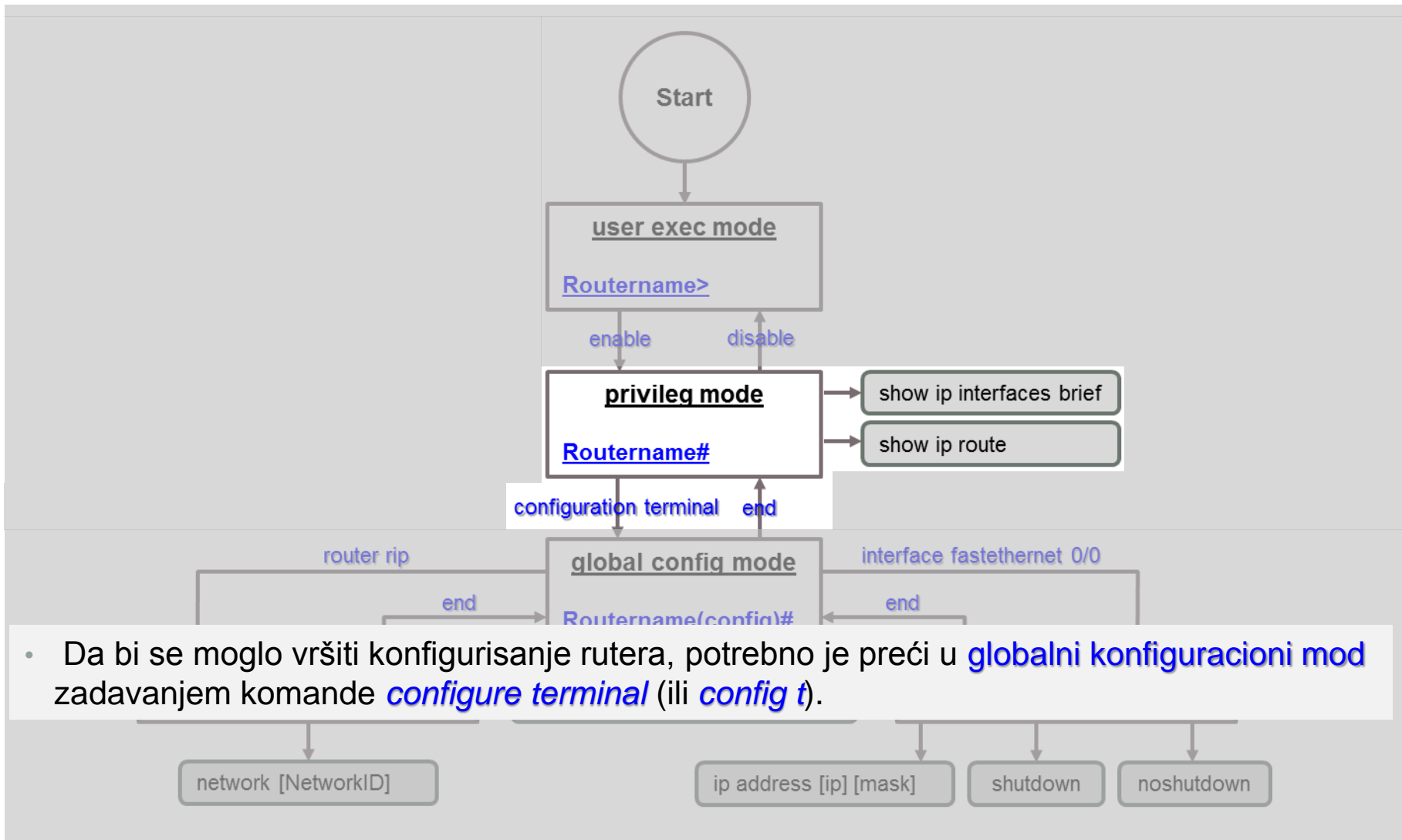
Gateway of last resort is not set

Router#
    
```

- U privileg modu moguć je pregled IP-a rutera i svih interfejsa (portova)

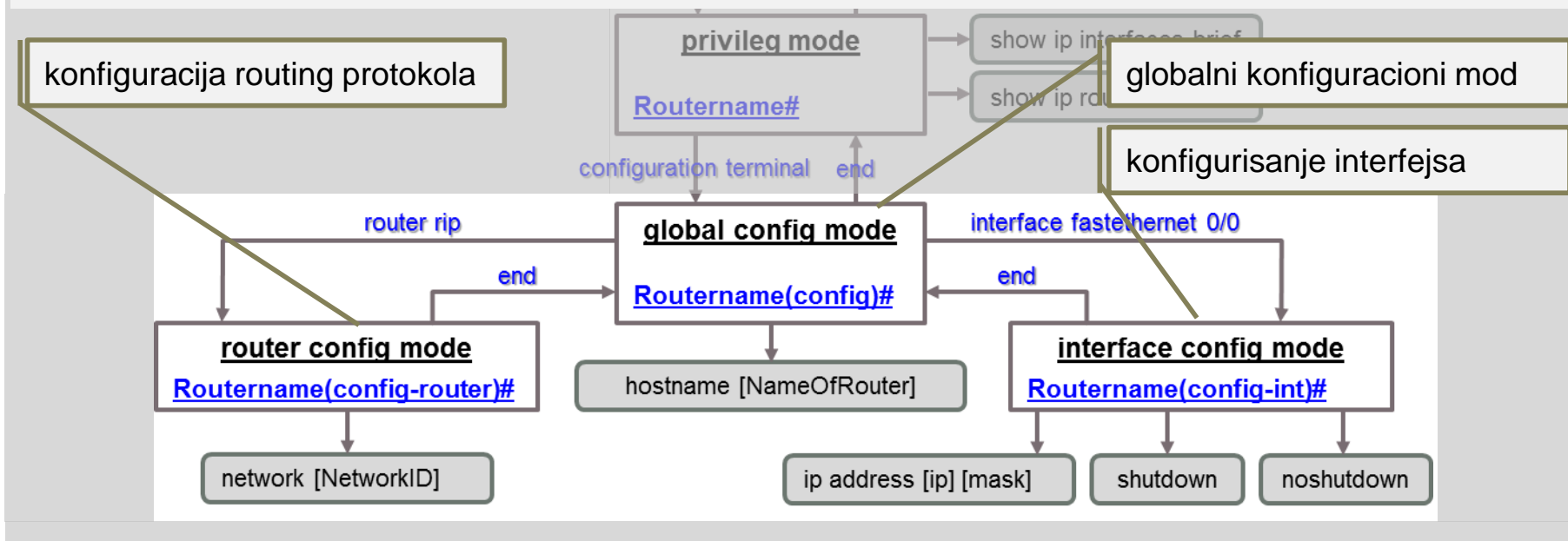


Cisco IOS Command Line Interface



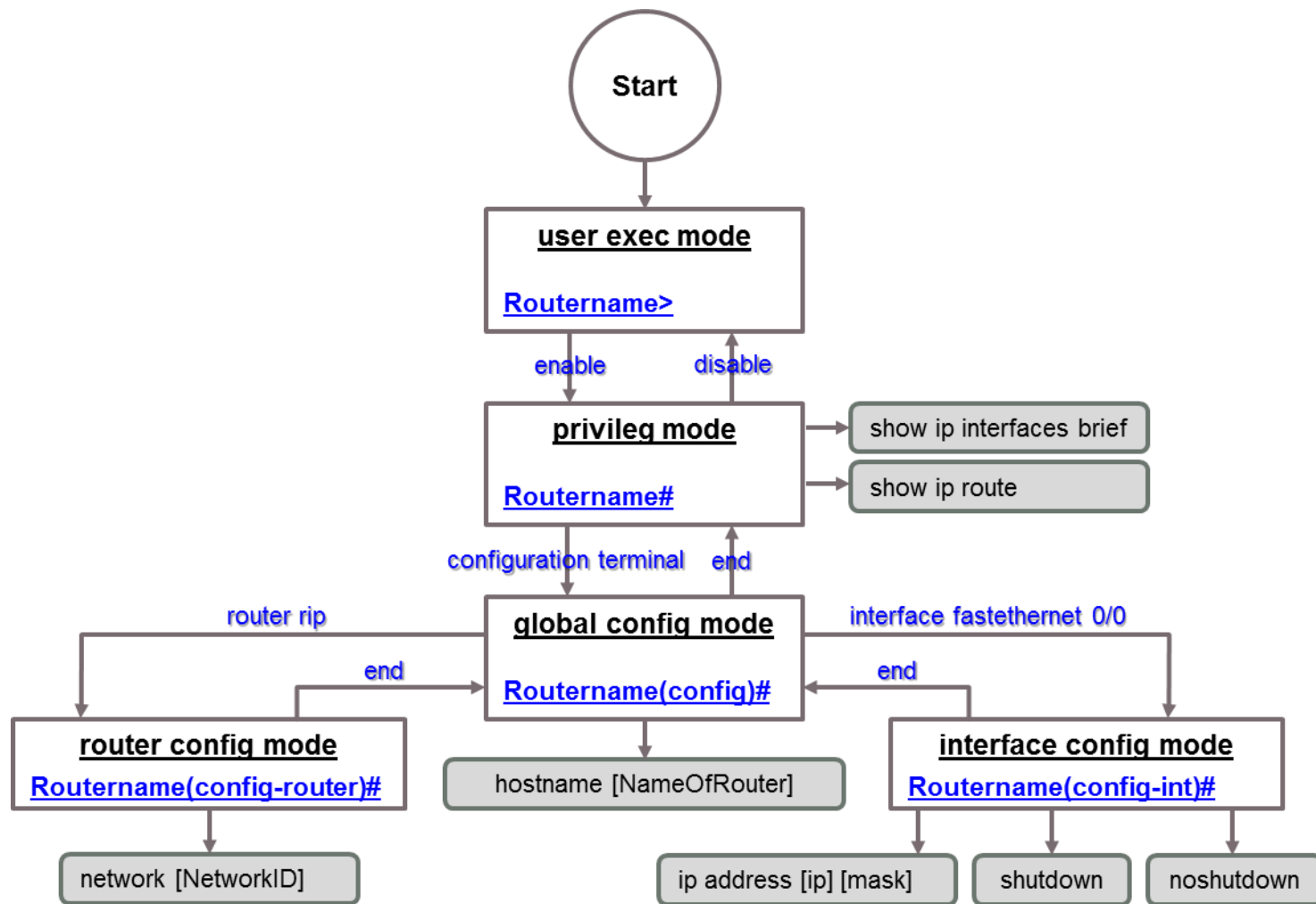
Cisco IOS Command Line Interface

- U ovom modu moguće je podešavati opšte parametre rutera (poput naziva, globalne šifre i sl), dok za konfigurisanje specifičnih delova postoji čitav niz pod-modova.
- Ovim modovima se pristupa zadavanjem komandi kao što su:
 - interface (za konfigurisanje interfejsa),
 - router (za konfiguraciju routing protokola), ili
 - line (za konfiguraciju konzole ili TELNET portova),...
- Za izlazak iz moda se upotrebljava naredba exit.





Cisco IOS Command Line Interface



Cisco IOS Command Line Interface

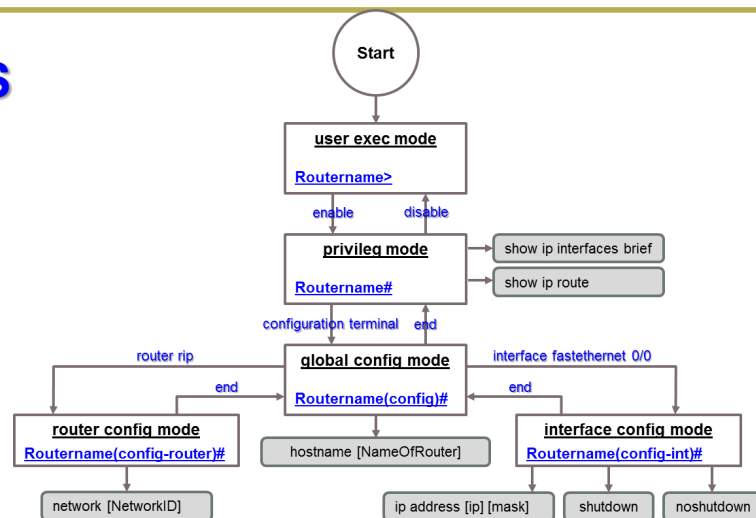
Komande IOS

Privilegovani mod:

enable	Ulazak u privilegovani mod
disable	Povratak iz privilegovanog moda
enable password	Postavljanje šifre za ulazak u privilegovani mod
enable secret	Postavljanje šifrovane lozinke za ulazak u privilegovani mod

Podešavanje šifre:

enable secret <šifra>	Postavljanje šifrovane lozinke za ulazak u privilegovani mod
enable password <šifra>	Postavljanje šifre za ulazak u privilegovani mod
Set password for console access: (config)#line console 0 (config-line)#login (config-line)#password <šifra>	Postavljanje šifre za konzolni mod
Set password for virtual terminal (telnet) access: (config)#line vty 0 4 (config-line)#login (config-line)#password <šifra>	Postavljanje šifre za virtuelni terminal (telnet)





Cisco IOS Command Line Interface

Komande IOS

Podešavanje šifre:

Set password for auxiliary (modem) access: (config)#line aux 0 (config-line)#login (config-line)#password <šifra>	Postavljanje lozinke za pomoćni pristup
--	---

Konfigurisanje rutera:

config t	Ulazak u deo za konfigurisanje terminala
config mem	Izvršavanja komandi smeštenih u NVRAM. Kopiranje konfig fajla.
config net	Preuzimanje informacija preko TFTP servera

Generalne komande:

no shutdown	aktiviranje (podizanje, omogućavanje) interfejsa
reload	restartovanje rutera
sh ver	Verzija Cisco IOS – a, i još dosta informacija o ruteru
sh clock	Prikaz datuma i vremena podešenih na ruretu



Cisco IOS Command Line Interface

Komande IOS

Generalne komande:

sh history	prikaz istorije primenjenih komandi
sh debug	prikaz svih omogućenih debugovanja (otklanjanja grešaka)
no debug all	isključenje svih debugovanja
sh users	Prikaz podataka ulogovanog korisnika
sh protocols	Prikaz konfiguracija svih konfigurisanih protokola
banner motd # poruka u baneru #	Podešavanje banera
hostname <naziv_rutera>	Podešavanje imena rutera
clear counters	Pražnjenje brojača interfejsa

OSNOVNA KONFIGURACIJA SWITCHA

Cisco Internetworking Operating System

Konfigurisanje switch – a

Osnovne komande za konfigurisanje sviča:

switch# show running-config	prikaz trenutne konfiguracije
switch# show startup-config	prikaz startne konfiguracije
switch# configure terminal (skraćeno: config t)	ulaz u globalni config mod
switch(config)# hostname SW1 sw1# exit	postavljanje imena sviča na SW1
SW1 (config)# line console 0 SW1 (config-line)# line console 0 SW1 (config-line)# password 9maj SW1 (config-line)# login SW1 (config-line)# exit	ulaz u config mod console ulaz u config mod console postavljanje šifre: 9maj za ulaz preko console prihvatanje šifre 9maj za ulaz preko konzole prelaz iz line u global config mod





Konfigurisanje switch – a

Osnovne komande za konfigurisanje sviča:

<pre>SW1#line vty 0 15 SW1#password 9maj SW1#login SW1#exit</pre>	<p>ulaz u konfig mod vty – telnet postavljanje šifre 9maj za ulaz preko telnet prihvatanje šifre 9maj za ulaz preko telnet prelaz iz line u global config mod</p>
<pre>SW1#enable password skola</pre>	<p>aktiviranje šifre skola na sviču</p>
<pre>SW1#enable secret class</pre>	<p>aktiviranje enkripcije šifre class na sviču</p>
<pre>SW1(config)#interface vlan 1 SW1(config-if)#ip address 192.168.1.2 255.255.255.0 SW1(config-if)#no shutdown SW1(config-if)#exit SW1(config)#ip default-gateway 192.168.1.1 SW1(config-if)#exit SW1(config)#exit</pre>	<p>ulazak u config mod interface VLAN 1 postavljanje IP adrese za VLAN 1 zabrana gašenja interface ulaz u global config mode postavljanje default gateway – a za VLAN 1 ulaz u global config mode</p>
<pre>SW1#show interface vlan 1 SW1#copy running-config startup-config SW1#show running-config</pre>	<p>prikaz interface – a VLAN 1 učitavanje trenutne konfiguracije u NVRAM prikaz trenutne konfiguracije</p>



Konfigurisanje switch – a

Osnovne komande za konfigurisanje sviča:

switch# config t switch(config)# hostname SW1 SW1# SW1# show version	ulaz u globalni config terminal mod postavljanje imena za uređaj prikaz verzije IOS – a
SW1# show interfaces	prikaz svih interfejsa na sviču
SW1# copy running config startup-config	učitavanje trenutne konfiguracije u NVRAM
SW1# show vlan	prikaz VLAN – ova

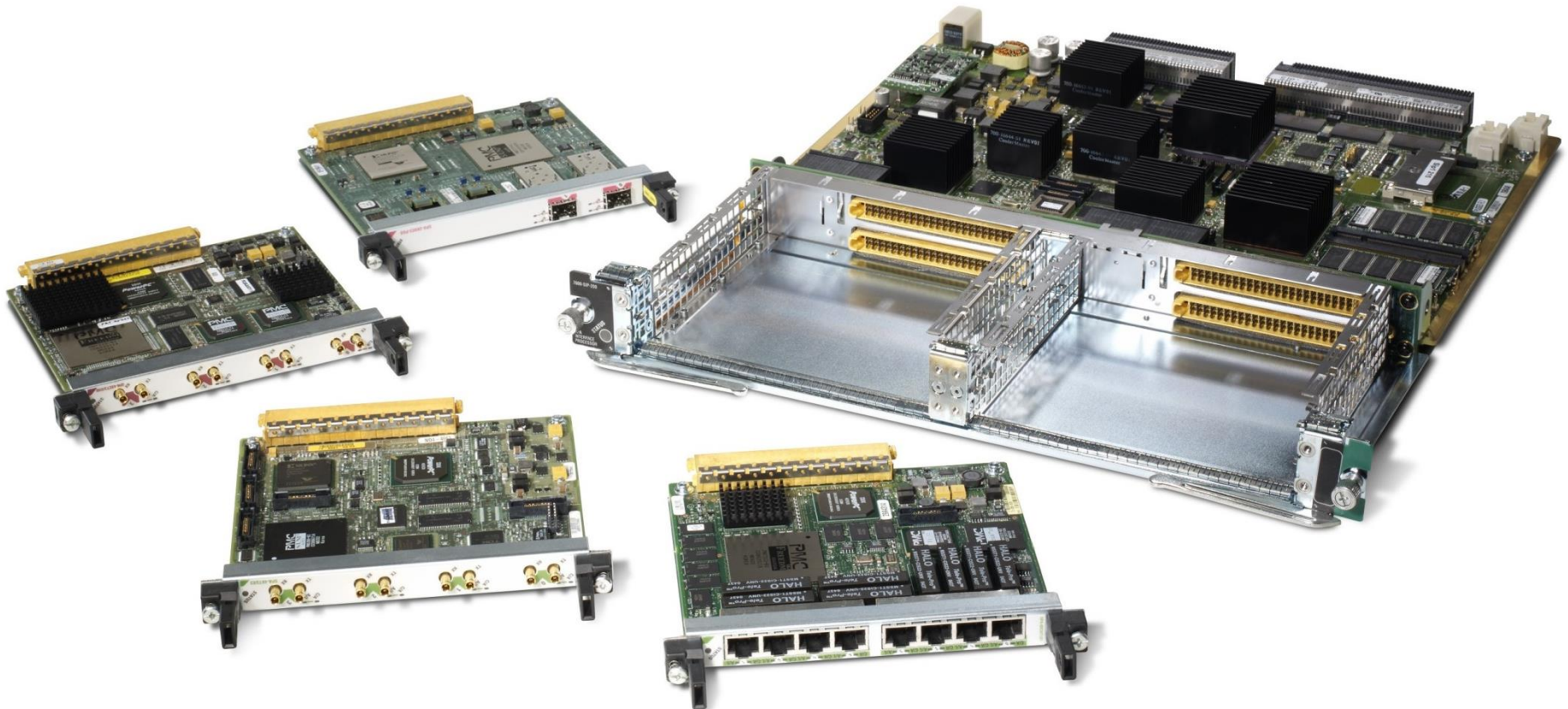
OSNOVNA KONFIGURACIJA ROUTERA

Cisco Internetworking Operating System

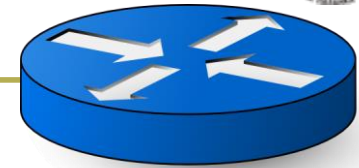
Konfigurisanje router – a



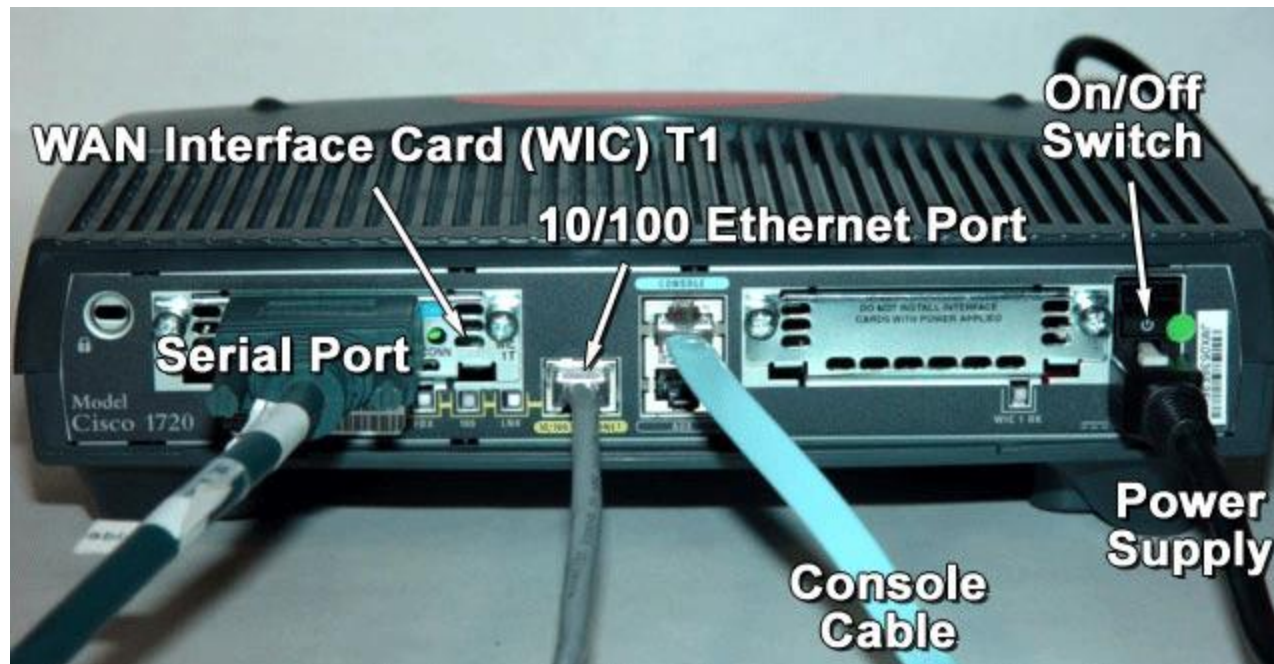
Na slici je prikazana modularna arhitektura rutera. Prilikom simulacija kola sa ruterima u Packet Traceru, ukoliko se upotrebljavaju generički ruteri, neophodno im je dodati potrebne module.



Konfigurisanje router – a



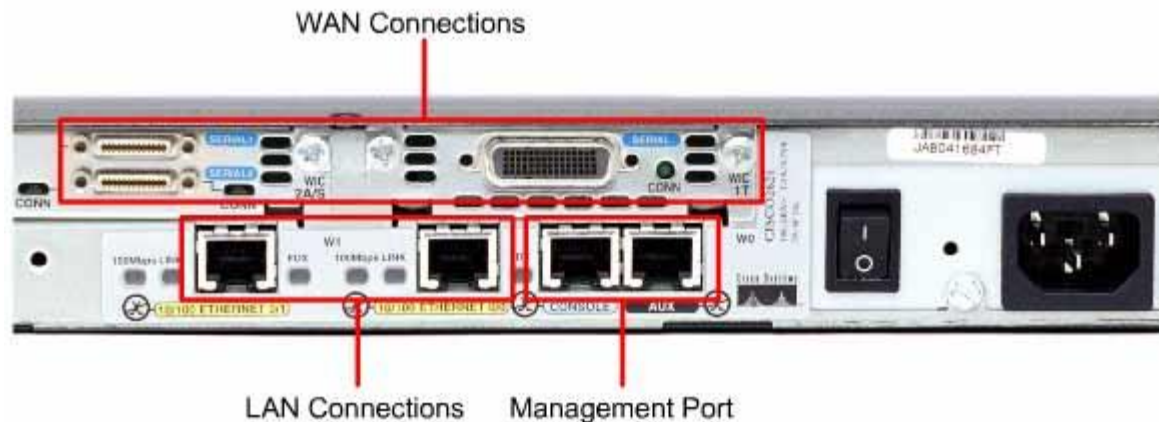
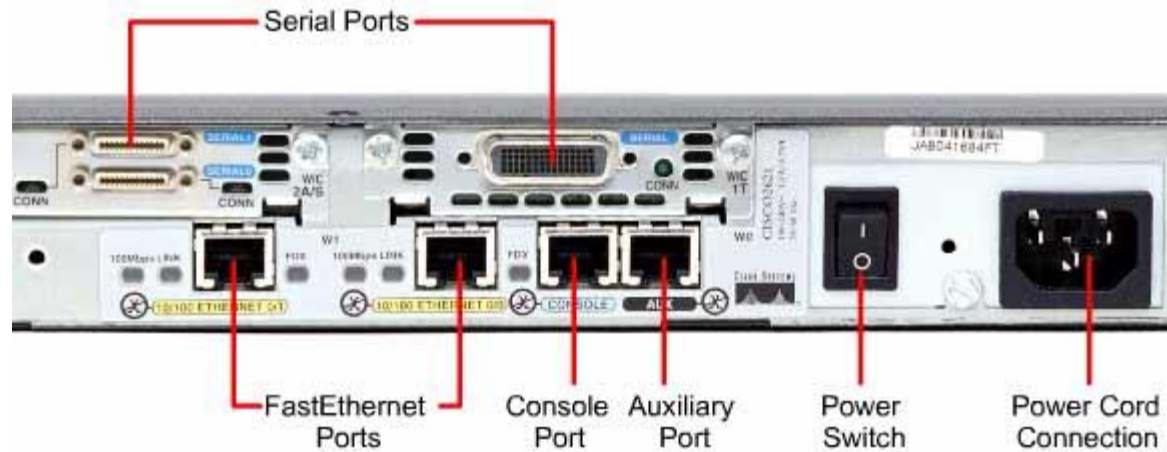
Portovi rutera:



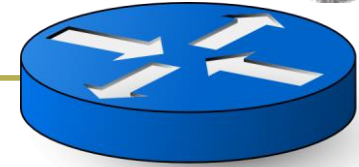
Konfigurisanje router – a



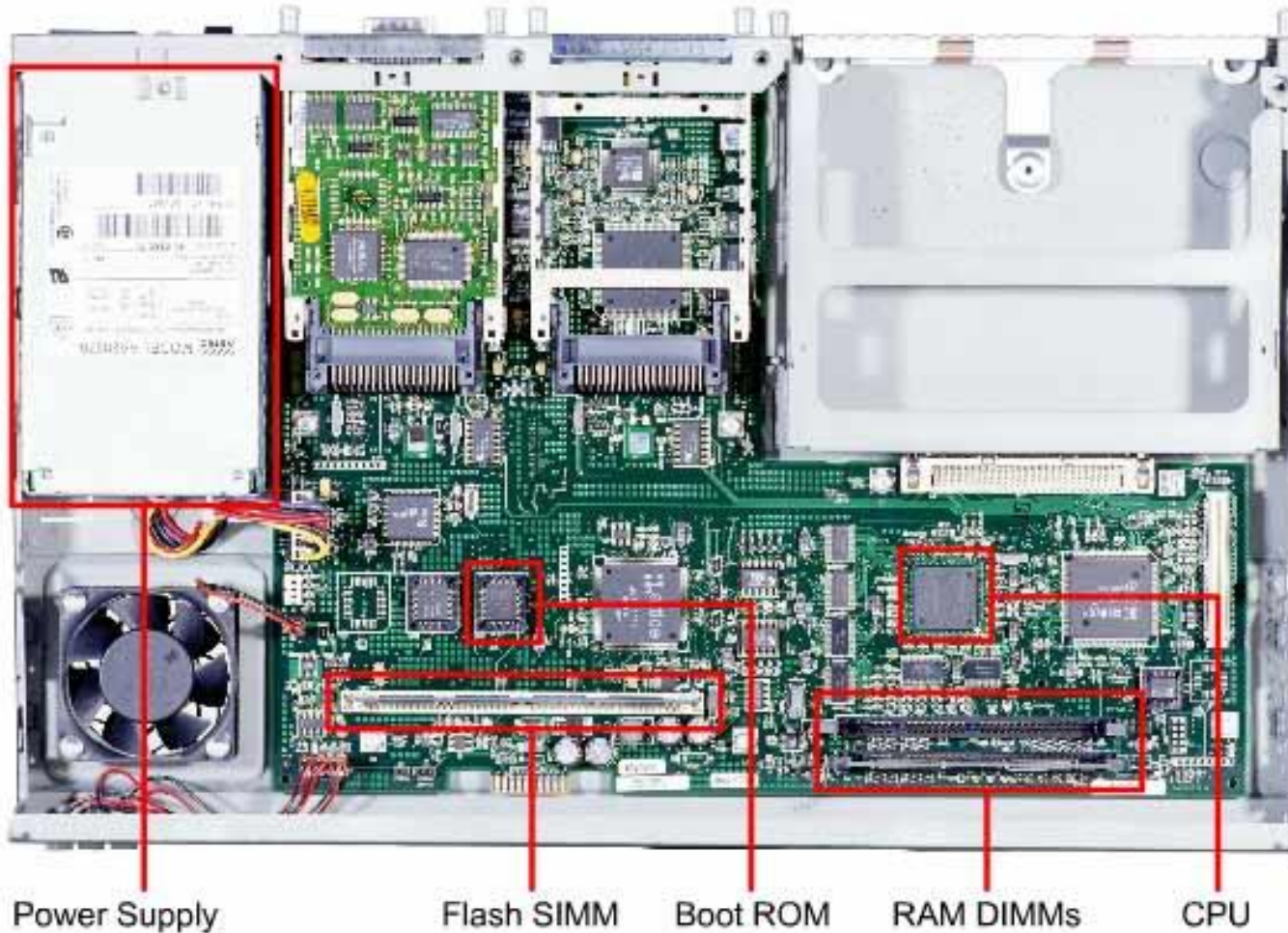
Portovi rutera:



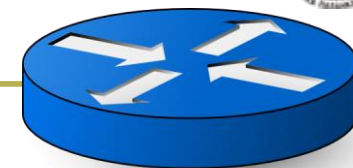
Konfigurisanje router – a



Unutrašnjost rutera:

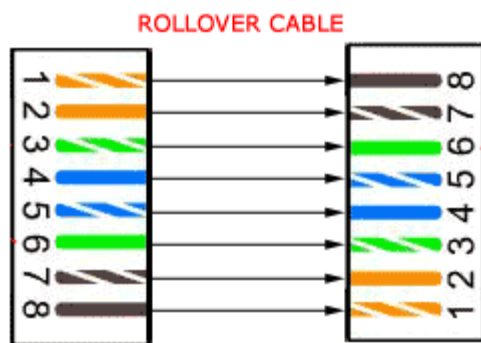


Konfigurisanje router – a



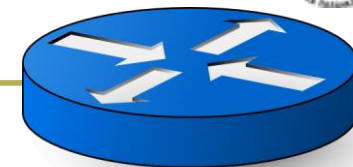
Priključenje rutera za administraciju:

Računar se priključuje na ruter preko Console porta pomoću Rollover kabla koji se spaja preko adaptera RJ45/DB9. UTP utikač se spaja na DB9 adapter, a adapter na COM port na računaru (ako PC ne poseduje COM port, koristi se kabl USB/DB9 radi priključenja na USB port računara).



Rollover kabl služi za spajanje AUX porta i modema preko RJ45/DB9 adaptera. Nakon uspešne konekcije na ruter, pomoću programa (npr Hyper Terminal) vrše se potrebna podešavanja za pristup Command Line Interface-u radi pisanja naredbi.

Konfigurisanje router – a



Osnovna konfiguracija rutera:

Da bi ruter imao minimalnu funkcionalnost potrebno je definisati i postaviti određene parametre na njemu. Neki od njih su:

1. Ime rutera (Router name)
2. Poruka dobrodošlice, upozorenja ili slično (prilikom konekcije na ruter)
3. Password za pristup preko Console porta (preko Rollover kabla)
4. Password za pristup preko telnet linije (pristup sa udaljenog uređaja)
5. IP adresa za pojedini interface (port za konekciju) (Serial, Ethernet ili FastEthernet) + Subnet maska
6. Poruka nakon pristupa ruteru (Banners – login or message-of-the-day)
7. Host tablicu, odnosno naziv susednog rutera i njegovu IP adresu (Host tables)
8. Aktiviranje passworda na ruteru
9. Enkripciju za Password



IOS Command Prompt:

Router>	User EXEC mode
Router#	Privileged EXEC mode
Router(config)#	Configuration mode (notice the # sign indicates this is only accessible at privileged EXEC mode.)
Router(config-if)#	Interface level within configuration mode.
Router(config-router)#	Routing engine level within configuration mode.
Router(config-line)#	Line level (vty, tty, async) within configuration mode.



Cisco IOS Commands

Commands	Description
<u>Exec mode</u>	
clear mac-address-table	Delete all addresses currently in the MAC address table.
show mac-address-table	Display the MAC address table.
show port block	Display the blocking of unicast and multicast filtering for the port.
show port group	Display the ports that have been assigned to groups.
show port monitor	Display the ports that have had port monitoring enabled for them.
show port security	Display the ports that have had port security enabled.
show port storm-control	Display the disposition of broadcast-storm control.
<u>Configuration mode</u>	
mac-address-table aging-time	Set the length of time that a dynamic entry can remain in the address table.
mac-address-table dynamic	Enable address learning on the current interface.
mac-address-table secure	Add entries to the address table that are known to be secure addresses.
mac-address-table static	Add static entries to the address table.



Cisco IOS Commands

Commands	Description
<u>Interface configuration mode</u>	
ip address	Delete all addresses currently in the MAC address table.
duplex	Specify the duplex mode of operation for an interface.
port block	Prevent the flooding of unknown destination MAC addresses and multicast address on this interface.
port group	Place this interface into a port aggregation group
port monitor	Implement port monitoring on this port.
port security	Enable port security on a port.
port storm-control	Broadcast traffic is disabled if too many broadcast packets are seen on this port.
shutdown	Disable an interface.
spantree disable	Disable Spanning-Tree Protocol for the switch.
spantree forwarding-time	Specify the forward delay interval for the switch.
spantree hello-time	Specify the interval between Hello Bridge Protocol Data Units (BPDUs).



Cisco IOS Commands

Commands	Description
<u>Interface configuration mode</u>	
spantree max-age	Change the interval the switch waits to hear BPDUs from the root bridge.
spantree cost	Set a different path cost.
spantree priority	Configure the priority of an individual bridge or the likelihood that it will be selected as the root bridge.
spantree priority	Configure the Spanning-Tree Protocol priority of a port.
spantree protocol	Define the type of Spanning-Tree Protocol.
speed	Specify the speed of an interface.