

Konfiguracija IGRP Ruting protokola na Ruteru

IGRP (Interior Gateway Routing Protocol)

Ruteri komuniciraju međusobno tako što koriste Routing protokol.

Jedan od Routing protokola je **IGRP**

Poželjno je da razlikujete **Routed** i **Routing** protokole. Za detalje vidi

<http://www.ic.ims.hr/forum/viewtopic.php?t=414>

Ruteri se međusobno dogovaraju za stanje u mreži, razmjenjuju informacije:

- o mreži na koju su konektirani,
- o mreži koja je aktivna
- itd....

IGRP je također Distance Vector Routing Protocols kao i RIPv1 koji je istražen od strane Cisco tvrtke. Za razliku od RIPv1 (30 sec), IGRP šalje update svoje Routing tablice svakih 90 sekundi.

Za detalje vidi <http://www.cisco.com/univercd/cc/td/doc/cisintwk/ics/cs004.htm>

Značajke IGRP Routing protokola:

- Classful Routing Protocol (znači da ne podržava VLSM, za tu podršku Cisco je definirao EIGRP)
- Update svakih 90 sec. by default
- Nema razlike između interne i externe rute
- Maximum Hop Count = 255
- Po defaultu IGRP koristi Bandwidth i Delay (kašnjenje) kao metriku.
- Administrativna distanca po defaultu je 100.

Glavne dizajn karakteristike IGRP-a su sljedeće:

- mogućnost automataskog rukovanja beskonačnim i kompleksnim topologijama
- fleksibilnost potrebna za segmentiranje s različitim bandwidthom
- mogućnost upotrebe u jako velikim mrežama

IGRP upotrebljava sljedeće elemente za metriku:

- Bandwidth – The lowest bandwidth value in the path
- Delay – The cumulative interface delay along the path
- Reliability (pouzdanost)– The reliability on the link toward the destination as determined by the exchange of keepalives
- Load – The load on a link toward the destination based on bits per second

Postoje tri tipa ruta koje IGRP može oglašavati (advertise)

- Interior
- System
- Exterior

Interior Routing protocol

- **IGP** (Interior Gateway Protocol) funkcioniira unutar jednog Autonomnog Sistema (AS)

Exterior Routing protocol

BGP (Border Gateway Protocol)

Ključne karakteristike BGP-a su sljedeće:

- distance vector exterior routing protocol

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 - upotrebljava se između ISP-ISP ili ISP-Klijent
 - upotrebljava se između Autonomnih Sistema (AS)

Za stabilnost IGRP Routing protokola važne su tri značajke:

- Hold down
- Split horizons
- Poison reverse updates

Važno je upamtiti ove tri tablice

Slika 1.

Routing Protocol	IGP	EGP
RIP	✓	
IGRP	✓	
OSPF	✓	
BGP		✓
EIGRP	✓	

Routing Protocol	Distance Vector	Link-State
OSPF		✓
EIGRP	✓	
RIP	✓	
IGRP	✓	

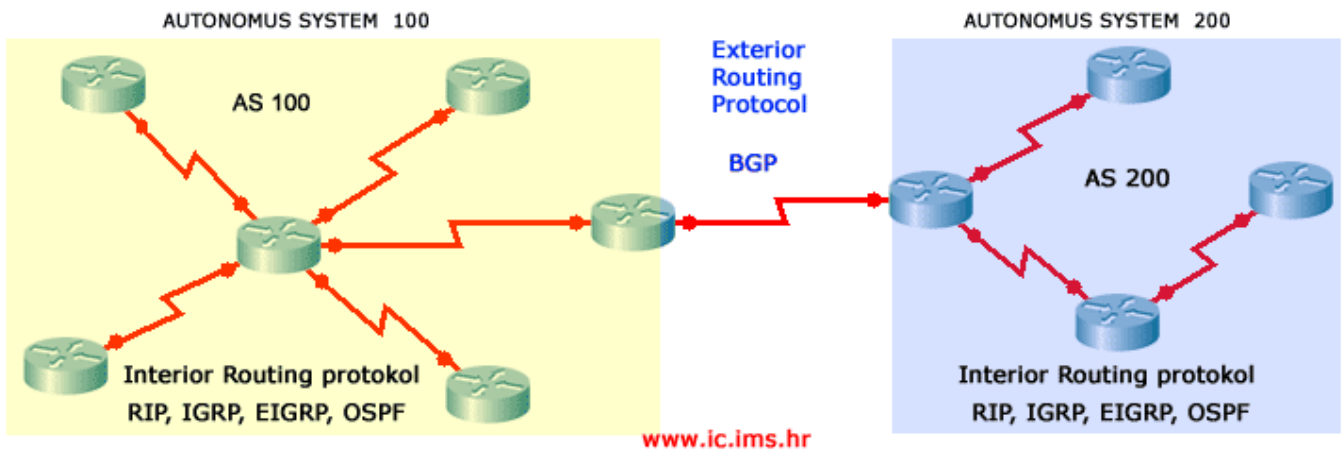
Slika 1a.

CISCO Default Administrative distances

Route source	Administrative Distance (AD)
Connected Interface	0
Static Route	1
EIGRP Summary Route	5
External BGP	20
EIGRP	90
IGRP	100
OSPF	110
IS-IS	115
RIP	120
EGP	140
External EIGRP	170
Internal BGP	200
Unknown	255

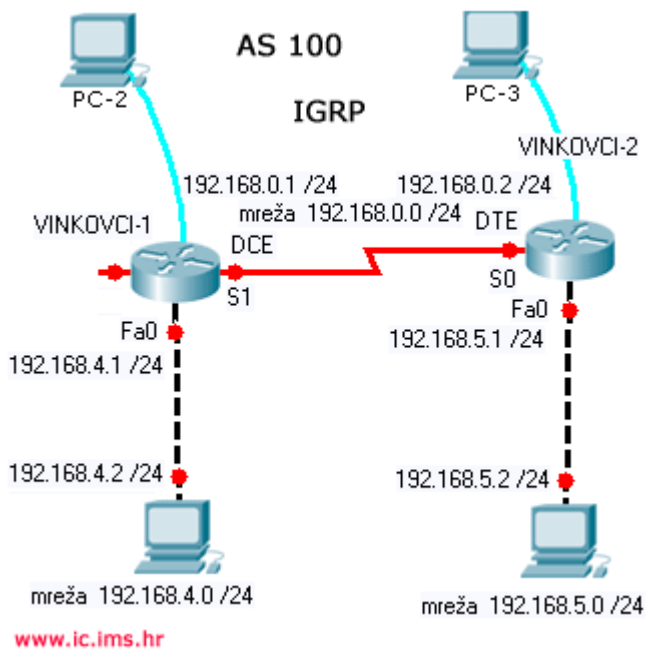
Primjer mreže gdje se može upotrijebiti IGRP Routing protokol.
 Što je Autonomus System? Laički možemo reći to je mreža pod zajedničkom administracijom.
 Na slici 2. možete uočiti RIP i OSPF Routing protokole. Prilikom konfiguracije IGRP i EIGRP zahtjevaju broj AS, OSPF zahtjeva broj procesa (Proces ID), RIP ne zahtjeva nijedno.

Slika 2.



Konfiguracija IGRP Routing protokola.

Slika 3.



RUTER Vinkovci-1

```
Router>
Router#configure terminal
Router(config)#hostname Vinkovci-1
Vinkovci-1(config)#banner motd #Dobrodosli na Router Vinkovci-1#

Vinkovci-1(config)#line console 0
Vinkovci-1(config-line)#password cisco
Vinkovci-1(config-line)#login
Vinkovci-1(config-line)#exit

Vinkovci-1(config)#line vty 0 4
Vinkovci-1(config-line)#password cisco
Vinkovci-1(config-line)#login
Vinkovci-1(config-line)#exit

Vinkovci-1(config)#enable password cisco
Vinkovci-1(config)#enable secret class
```

```
Vinkovci-1(config)#ip host Vinkovci-2 192.168.0.2
```

```
Vinkovci-1(config)#interface serial 1  
Vinkovci-1(config-if)#ip address 192.168.0.1 255.255.255.0  
Vinkovci-1(config-if)#clock rate 64000 // postavljanje Interface-a Ruteru za DCE signal  
Vinkovci-1(config-if)#no shutdown  
Vinkovci-1(config-if)#description Serial konekcija prema Vinkovci-2  
Vinkovci-1(config-if)#exit
```

```
Vinkovci-1(config)#interface fastethernet 0  
Vinkovci-1(config-if)#ip address 192.168.4.1 255.255.255.0  
Vinkovci-1(config-if)#no shutdown  
Vinkovci-1(config-if)#description LAN mreza  
Vinkovci-1(config-if)#exit  
Vinkovci-1(config)#exit
```

```
Vinkovci-1#copy running-config startup-config
```

RUTER Vinkovci-2

```
Router>  
Router>enable  
Router#configure terminal  
Router(config)#hostname Vinkovci-2
```

```
Vinkovci-2(config)#banner motd #Dobrodosli na Router Vinkovci-2#
```

```
Vinkovci-2(config)#line console 0  
Vinkovci-2(config-line)#password cisco  
Vinkovci-2(config-line)#login  
Vinkovci-2(config-line)#exit
```

```
Vinkovci-2(config)#line vty 0 4  
Vinkovci-2(config-line)#password cisco  
Vinkovci-2(config-line)#login  
Vinkovci-2(config-line)#exit
```

```
Vinkovci-2(config)#enable password cisco  
Vinkovci-2(config)#enable secret class
```

```
Vinkovci-2(config)#ip host Vinkovci-1 192.168.0.1
```

```
Vinkovci-2(config)#interface serial 0  
Vinkovci-2(config-if)#ip address 192.168.0.2 255.255.255.0  
Vinkovci-2(config-if)#no shutdown  
Vinkovci-2(config-if)#description Serial konekcija prema Vinkovci-1  
Vinkovci-2(config-if)#exit
```

```
Vinkovci-2(config)#interface fastethernet 0  
Vinkovci-2(config-if)#ip address 192.168.5.1 255.255.255.0  
Vinkovci-2(config-if)#no shutdown  
Vinkovci-2(config-if)#description LAN konekcija  
Vinkovci-2(config-if)#exit  
Vinkovci-2(config)#exit
```

```
Vinkovci-2#copy running-config startup-config
```

Sada smo konfigurirali osnovne konfiguracije na oba Ruteru. Da bi isti mogli međusobno komunicirati i stvarati svoje Routing tablice potrebno je konfigurirati jedan od Routing protokola. Mi će mo konfigurirati IGRP Routing protokol

Konfiguracija IGRP Routing protokola na Vinkovci-1 Ruteru

```
Vinkovci-1#configure terminal
Vinkovci-1(config)#router igrp 100 // postavljanje IGRP routing protokola sa AS 100
Vinkovci-1(config-router)#network 192.168.4.0 // oglašavanje mreže
Vinkovci-1(config-router)#network 192.168.0.0 // oglašavanje mreže
Vinkovci-1(config-router)#exit
Vinkovci-1(config)#exit
Vinkovci-1#copy running-config startup-config
```

Konfiguracija IGRP Routing protokola na Vinkovci-2 Ruteru

```
Vinkovci-2#configure terminal
Vinkovci-2(config)#router igrp 100 // postavljanje IGRP routing protokola sa AS 100
Vinkovci-2(config-router)#network 192.168.5.0 // oglašavanje mreže
Vinkovci-2(config-router)#network 192.168.0.0 // oglašavanje mreže
Vinkovci-2(config-router)#exit
Vinkovci-2(config)#exit
Vinkovci-2#copy running-config startup-config
```

Važno je naglasiti da IGRP funkcionira samo unutar istog Autonomus Systema.

Za provjeru IGRP-a možemo koristiti neke od naredbi:

- show interfaceinterface
- show running-config
- show running-config interfaceinterface
- show running-config | begin interfaceinterface
- show running-config | begin igrp
- show ip protocols

Idemo vidjeti kako izgledaju rute koje je oglasio IGRP.

Ruter Vinkovci-1

Kod:

```
Vinkovci-1#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
       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, * - candidate default
       U - per-user static route

Gateway of last resort is not set

C    192.168.4.0 is directly connected, FastEthernet0
C    192.168.0.0 is directly connected, Serial1
I    192.168.5.0 [100/651] via 192.168.0.2, 00:05:21, Serial1 // ruta naučena IGRP
Routing protokolom
```

Ruter Vinkovci-2

Kod:

```
Vinkovci-2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
```

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D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
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, * - candidate default
U - per-user static route

Gateway of last resort is not set

```
C 192.168.0.0 is directly connected, Serial0
C 192.168.5.0 is directly connected, FastEthernet0
I 192.168.4.0 [100/651] via 192.168.0.1, 00:09:25, Serial0
```

Uočite da je u gornjem output-u na ruti koja je naučena preko IGRP Routing protokola iza IP adrese imamo AD i metriku [100/651], gdje broj 100 definira defaultnu AD a 651 metric- vrijednost.

Idemo provjeriti protokol: Sa naredbom **#show ip protocols** možemo vidjeti dosta toga: (Routing protocol, vrijeme update-a, hold-down timer, IGRP metriku, max hop-count, oglašene mreže, Administrativnu distancu....)

Kod:

```
Vinkovci-1#show ip protocols
Routing Protocol is "igrp 100"
  Sending updates every 90 seconds, next due in 31 seconds
  Invalid after 270 seconds, hold down 280, flushed after 630
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  IGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  IGRP maximum hopcount 100
  IGRP maximum metric variance 1
  Redistributing: igrp 100
  Routing for Networks:
    192.168.0.0
    192.168.4.0
  Routing Information Sources:
    192.168.0.2      100      00:00:00
  Distance: (default is 100)
```

Evo još jednog output-a gdje možemo vidjeti, stanje Interface-a, IP adresu, Bandwidth vrijednost (1544 Kbit) , Delay =1000, Reliability (pouzdanost) 255/255, Load 1/255 kao i vrstu enkapsulacije.

Kod:

```
Vinkovci-1#show interface serial 1
Serial1 is up, line protocol is up
  Hardware is HD64570
  Internet address is 192.168.0.1/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of show interface counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 1000 bits/sec, 2 packets/sec
  5 minute output rate 1000 bits/sec, 2 packets/sec
    0 packets input, 0 bytes, 0 no buffer
```

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```
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 input packets with dribble condition detected
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
```

I na kraju idemo vidjeti cijelu konfiguraciju jednog od Rutera

Kod:

```
Vinkovci-1#show running-config
Building configuration...
!
Version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Vinkovci-1
enable secret 5 $sdf$6978yhg$jnb76sd
enable password cisco
!
ip subnet-zero
ip host Vinkovci-2 192.168.0.2
!
interface Serial0
no ip address
no ip directed-broadcast
shutdown
!
interface Serial1
ip address 192.168.0.1 255.255.255.0
no ip directed-broadcast
clock rate 64000
!
interface FastEthernet0
ip address 192.168.4.1 255.255.255.0
no ip directed-broadcast
bandwidth 100000
!
router igrp 100
network 192.168.0.0
network 192.168.4.0
!
ip classless
no ip http server
!
line con 0
login
transport input none
password cisco
line aux 0
line vty 0 4
login
password cisco
```

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!
no scheduler allocate
end

Evo kako izgleda kada pingamo sa jednog PC-a u mreži na drugi PC u drugoj mreži

Kod:

```
C:>ping 192.168.5.2  
Pinging 192.168.5.2 with 32 bytes of data:
```

```
Reply from 192.168.5.2: bytes=32 time=60ms TTL=241  
Reply from 192.168.5.2: bytes=32 time=60ms TTL=241  
Reply from 192.168.5.2: bytes=32 time=60ms TTL=241  
Reply from 192.168.5.2: bytes=32 time=60ms TTL=241  
Reply from 192.168.5.2: bytes=32 time=60ms TTL=241
```

```
Ping statistics for 192.168.5.2:    Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
    Minimum = 50ms, Maximum = 60ms, Average = 55ms
```

Ako želite više detalja, posjetite www.cisco.com ili upišite školovanje na Cisco Networking Academy za CCNA 😊

Link: <http://www.ic.ims.hr/forum/viewtopic.php?t=416>