LAPORAN PRAKTIKUM KONSEP JARINGAN
(OSPF)

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PROGRAM STUDI D4 TEKNIK INFORMATIKA

POLITEKNIK ELEKTRONIKA NEGERI SURABAYA (PENS)

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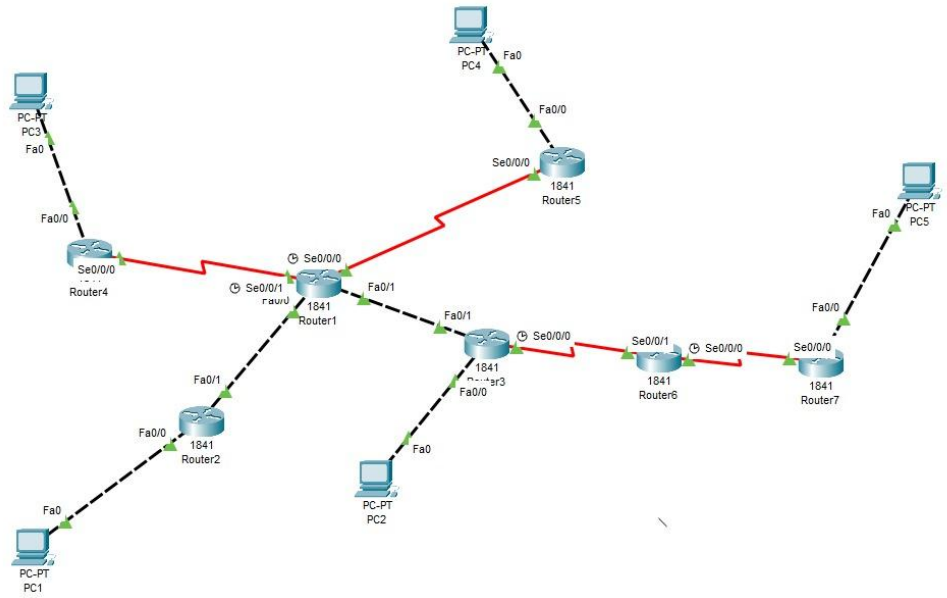
A. Tujuan Pembelajaran
   1. Memahami konsep Routing Dinamis
   2. Mengkonfigurasi Routing OSPF

B. Pendahuluan

Open Shortest Path First (OSPF) merupakan salah satu protokol routing dinamis yang digunakan untuk menentukan jalur terbaik dalam jaringan IP. OSPF termasuk kategori link-state routing protocol dan bekerja dengan algoritma Dijkstra (Shortest Path First). Protokol ini secara otomatis bertukar informasi routing antar-router dalam satu autonomous system, sehingga memudahkan administrator jaringan dalam mengelola topologi yang kompleks serta mendukung skala jaringan yang besar.

Dalam praktikum ini dilakukan konfigurasi OSPF antar-router untuk memungkinkan pertukaran rute secara dinamis. Peserta praktikum akan memahami konsep area OSPF, proses pembentukan neighbor adjacency, serta melakukan pengujian konektivitas jaringan. Dengan konfigurasi OSPF, setiap router dapat mengetahui jalur optimal menuju jaringan lain tanpa memasukkan rute secara statis, sehingga lebih efisien dan mudah dikelola pada jaringan berskala besar.

C. Langkah Praktikum
   1. Membuat topologi



Tabel routing:

a. R1

Protokol	Jaringan Tujuan	[AD/Metric]	Next-Hop IP	Interface Keluar
Connected	10.0.0.0/30	-	-	FastEthernet0/0
Connected	10.1.1.0/30	-	-	Serial0/0/1
OSPF Inter Area	10.2.2.0/30	[110/129]	172.16.0.2	FastEthernet0/1
Connected	172.16.0.0/28	-	-	FastEthernet0/1
OSPF	172.16.1.0/28	[110/65]	172.16.0.2	FastEthernet0/1
Connected	172.16.2.0/28	-	-	Serial0/0/1
OSPF Inter Area	192.168.0.0/24	[110/2]	10.0.0.2	FastEthernet0/0
OSPF	192.168.1.0/24	[110/66]	172.16.0.2	FastEthernet0/1
OSPF Inter Area	192.168.2.0/24	[110/65]	10.1.1.2	Serial0/0/1
OSPF	192.168.3.0/24	[110/194]	10.1.1.2	Serial0/0/1
OSPF Inter Area	192.168.4.0/24	[110/130]	172.16.0.2	FastEthernet0/1

b. R2

Protokol	Jaringan Tujuan	[AD/Metric]	Next-Hop IP	Interface Keluar
Connected	10.0.0.0/30	-	-	FastEthernet0/1
OSPF Inter Area	10.1.1.0/30	[110/65]	10.0.0.1	FastEthernet0/1
OSPF Inter Area	10.2.2.0/30	[110/130]	10.0.0.1	FastEthernet0/1
OSPF	172.16.0.0/28	[110/2]	10.0.0.1	FastEthernet0/1
OSPF Inter Area	172.16.1.0/28	[110/66]	10.0.0.1	FastEthernet0/1
OSPF Inter Area	172.16.2.0/28	[110/66]	10.0.0.1	FastEthernet0/1
Connected	192.168.0.0/24	-	-	FastEthernet0/0
OSPF Inter Area	192.168.1.0/24	[110/3]	10.0.0.1	FastEthernet0/1
OSPF Inter Area	192.168.2.0/24	[110/66]	10.0.0.1	FastEthernet0/1
OSPF Inter Area	192.168.3.0/24	[110/66]	10.0.0.1	FastEthernet0/1
OSPF Inter Area	192.168.4.0/24	[110/131]	10.0.0.1	FastEthernet0/1

c. R3

Protokol	Jaringan Tujuan	[AD/Metric]	Next-Hop IP	Interface Keluar
OSPF	10.0.0.0/30	[110/2]	172.16.0.1	FastEthernet0/1
OSPF Inter Area	10.1.1.0/30	[110/65]	172.16.0.1	FastEthernet0/1
OSPF Inter Area	10.2.2.0/30	[110/128]	172.16.2.2	Serial0/0/0
Connected	172.16.0.0/28	-	-	FastEthernet0/1
OSPF Inter Area	172.16.1.0/28	[110/65]	172.16.0.1	FastEthernet0/1
Connected	172.16.2.0/28	-	-	Serial0/0/0
OSPF Inter Area	192.168.0.0/24	[110/3]	172.16.0.1	FastEthernet0/1
Connected	192.168.1.0/24	-	-	FastEthernet0/0
OSPF Inter Area	192.168.2.0/24	[110/66]	172.16.0.1	FastEthernet0/1
OSPF Inter Area	192.168.3.0/24	[110/66]	172.16.0.1	FastEthernet0/1
OSPF Inter Area	192.168.4.0/24	[110/129]	172.16.2.2	Serial0/0/0

d. R4

Protokol	Jaringan Tujuan	[AD/Metric]	Next-Hop IP	Interface Keluar
OSPF Inter Area	10.0.0.0/30	[110/65]	10.1.1.1	Serial0/0/0
Connected	10.1.1.0/30	-	-	Serial0/0/0
OSPF Inter Area	10.2.2.0/30	[110/193]	10.1.1.1	Serial0/0/0
OSPF Inter Area	172.16.0.0/28	[110/65]	10.1.1.1	Serial0/0/0
OSPF Inter Area	172.16.1.0/28	[110/65]	10.1.1.1	Serial0/0/0
OSPF Inter Area	172.16.2.0/28	[110/129]	10.1.1.1	Serial0/0/0
OSPF Inter Area	192.168.0.0/24	[110/66]	10.1.1.1	Serial0/0/0
OSPF Inter Area	192.168.1.0/24	[110/66]	10.1.1.1	Serial0/0/0
Connected	192.168.2.0/24	-	-	FastEthernet0/0
OSPF Inter Area	192.168.3.0/24	[110/66]	10.1.1.1	Serial0/0/0
OSPF Inter Area	192.168.4.0/24	[110/194]	10.1.1.1	Serial0/0/0

e. R5

Protokol	Jaringan Tujuan	[AD/Metric]	Next-Hop IP	Interface Keluar
OSPF Inter Area	10.0.0.0/30	[110/65]	172.16.1.1	Serial0/0/0
OSPF	10.1.1.0/30	[110/65]	172.16.1.1	Serial0/0/0
OSPF Inter Area	10.2.2.0/30	[110/193]	172.16.1.1	Serial0/0/0
Connected	172.16.0.0/28	-	-	Serial0/0/0
Connected	172.16.1.0/28	-	-	Serial0/0/0
OSPF Inter Area	172.16.2.0/28	[110/129]	172.16.1.1	Serial0/0/0
OSPF Inter Area	192.168.0.0/24	[110/66]	172.16.1.1	Serial0/0/0
OSPF	192.168.1.0/24	[110/66]	172.16.1.1	Serial0/0/0
OSPF Inter Area	192.168.2.0/24	[110/129]	172.16.1.1	Serial0/0/0
Connected	192.168.3.0/24	-	-	FastEthernet0/0
OSPF Inter Area	192.168.4.0/24	[110/194]	172.16.1.1	Serial0/0/0

f. R6

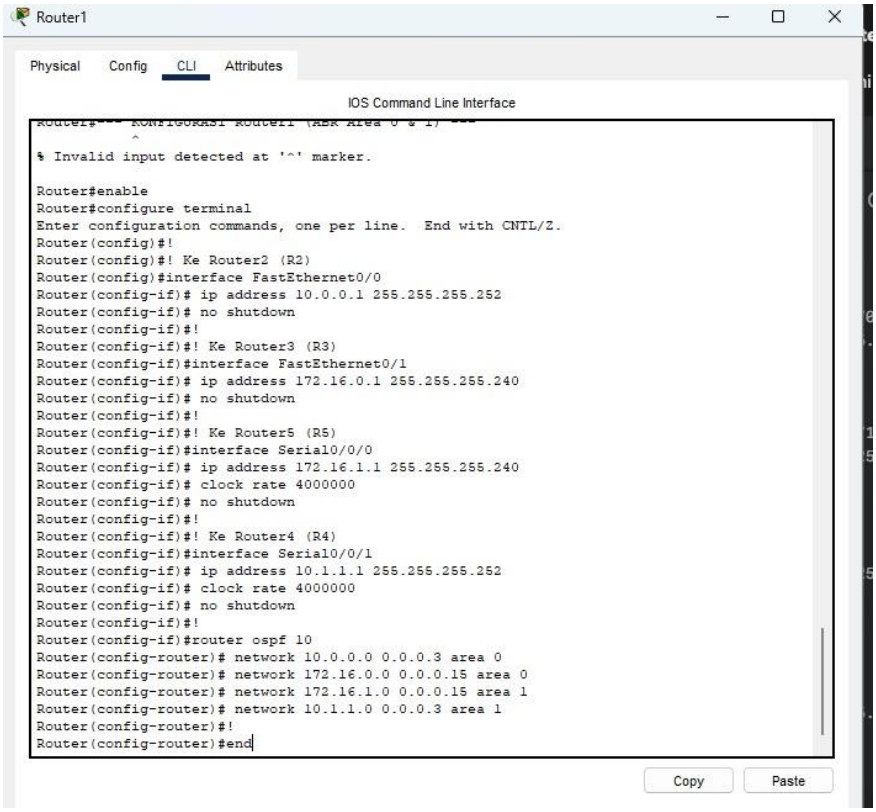
Protokol	Jaringan Tujuan	[AD/Metric]	Next-Hop IP	Interface Keluar
OSPF Inter Area	10.0.0.0/30	[110/66]	172.16.2.1	Serial0/0/1
OSPF Inter Area	10.1.1.0/30	[110/65]	172.16.2.1	Serial0/0/1
Connected	10.2.2.0/30	-	-	Serial0/0/1
OSPF Inter Area	172.16.0.0/28	[110/66]	172.16.2.1	Serial0/0/1
OSPF Inter Area	172.16.1.0/28	[110/65]	172.16.2.1	Serial0/0/1
Connected	172.16.2.0/28	-	-	Serial0/0/1
OSPF Inter Area	192.168.0.0/24	[110/67]	172.16.2.1	Serial0/0/1
OSPF Inter Area	192.168.1.0/24	[110/66]	172.16.2.1	Serial0/0/1
OSPF	192.168.2.0/24	[110/130]	172.16.2.1	Serial0/0/1
OSPF Inter Area	192.168.3.0/24	[110/130]	172.16.2.1	Serial0/0/1
OSPF Inter Area	192.168.4.0/24	[110/194]	10.2.2.2	Serial0/0/1

g. R7

Protokol	Jaringan Tujuan	[AD/Metric]	Next-Hop IP	Interface Keluar
OSPF Inter Area	10.0.0.0/30	[110/130]	10.2.2.1	Serial0/0/0
OSPF Inter Area	10.1.1.0/30	[110/65]	10.2.2.1	Serial0/0/0
Connected	10.2.2.0/30	-	-	Serial0/0/0
OSPF Inter Area	172.16.0.0/28	[110/129]	10.2.2.1	Serial0/0/0
OSPF Inter Area	172.16.1.0/28	[110/129]	10.2.2.1	Serial0/0/0
OSPF Inter Area	172.16.2.0/28	[110/131]	10.2.2.1	Serial0/0/0
OSPF Inter Area	192.168.0.0/24	[110/129]	10.2.2.1	Serial0/0/0
OSPF Inter Area	192.168.1.0/24	[110/129]	10.2.2.1	Serial0/0/0
OSPF Inter Area	192.168.2.0/24	[110/194]	10.2.2.1	Serial0/0/0
OSPF Inter Area	192.168.3.0/24	[110/194]	10.2.2.1	Serial0/0/0
Connected	192.168.4.0/24	-	-	FastEthernet0/0

2. Mengkonfigurasi router dan PC

a. R1


Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
% Invalid input detected at '^' marker.
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#!
Router(config)#! Ke Router2 (R2)
Router(config)#interface FastEthernet0/0
Router(config-if)# ip address 10.0.0.1 255.255.255.252
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#! Ke Router3 (R3)
Router(config-if)#interface FastEthernet0/1
Router(config-if)# ip address 172.16.0.1 255.255.255.240
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#! Ke Router5 (R5)
Router(config-if)#interface Serial0/0/0
Router(config-if)# ip address 172.16.1.1 255.255.255.240
Router(config-if)# clock rate 4000000
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#! Ke Router4 (R4)
Router(config-if)#interface Serial0/0/1
Router(config-if)# ip address 10.1.1.1 255.255.255.252
Router(config-if)# clock rate 4000000
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#router ospf 10
Router(config-router)# network 10.0.0.0 0.0.0.3 area 0
Router(config-router)# network 172.16.0.0 0.0.0.15 area 0
Router(config-router)# network 172.16.1.0 0.0.0.15 area 1
Router(config-router)# network 10.1.1.0 0.0.0.3 area 1
Router(config-router)#!
Router(config-router)#end
Copy
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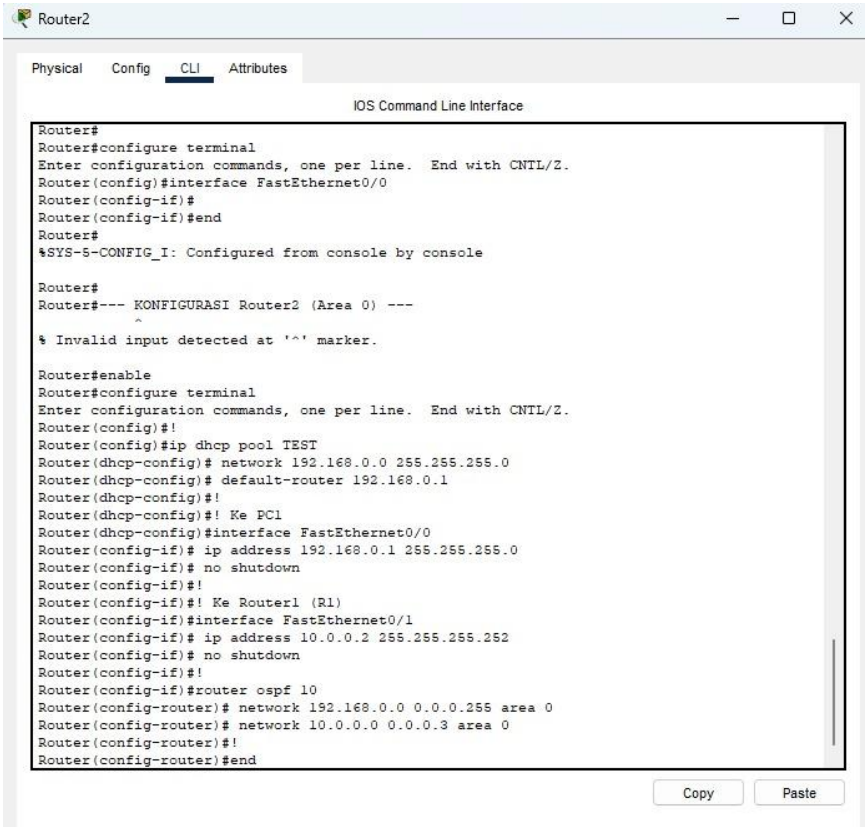
b. R2


Router2
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#
Router#--- KONFIGURASI Router2 (Area 0) ---
% Invalid input detected at '^' marker.
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#!
Router(config)#ip dhcp pool TEST
Router(dhcp-config)# network 192.168.0.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.0.1
Router(dhcp-config)#!
Router(dhcp-config)#! Ke PC1
Router(dhcp-config)#interface FastEthernet0/0
Router(config-if)# ip address 192.168.0.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#! Ke Router1 (R1)
Router(config-if)#interface FastEthernet0/1
Router(config-if)# ip address 10.0.0.2 255.255.255.252
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#router ospf 10
Router(config-router)# network 192.168.0.0 0.0.0.255 area 0
Router(config-router)# network 10.0.0.0 0.0.0.3 area 0
Router(config-router)#!
Router(config-router)#end
Copy
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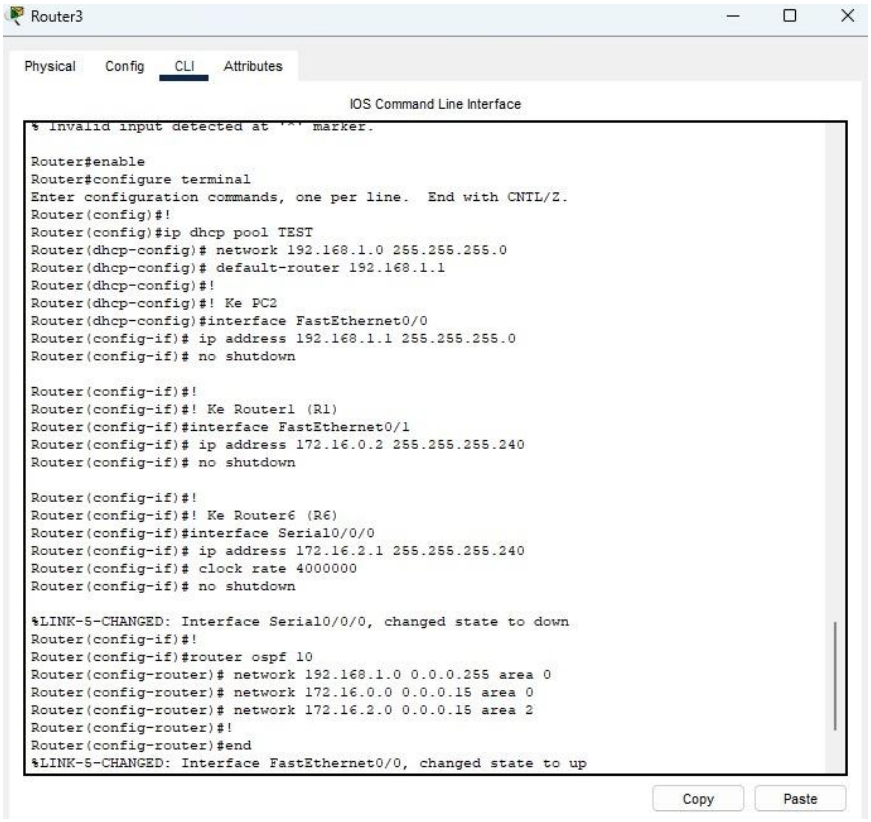
c. R3


Router3
Physical
Config
CLI
Attributes
IOS Command Line Interface
% Invalid input detected at '^' marker.
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#!
Router(config)#ip dhcp pool TEST
Router(dhcp-config)# network 192.168.1.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.1.1
Router(dhcp-config)#!
Router(dhcp-config)#! Ke PC2
Router(dhcp-config)#interface FastEthernet0/0
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#! Ke Router1 (R1)
Router(config-if)#interface FastEthernet0/1
Router(config-if)# ip address 172.16.0.2 255.255.255.240
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#! Ke Router6 (R6)
Router(config-if)#interface Serial0/0/0
Router(config-if)# ip address 172.16.2.1 255.255.255.240
Router(config-if)# clock rate 4000000
Router(config-if)# no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#!
Router(config-if)#router ospf 10
Router(config-router)# network 192.168.1.0 0.0.0.255 area 0
Router(config-router)# network 172.16.0.0 0.0.0.15 area 0
Router(config-router)# network 172.16.2.0 0.0.0.15 area 2
Router(config-router)#!
Router(config-router)#end
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
Copy
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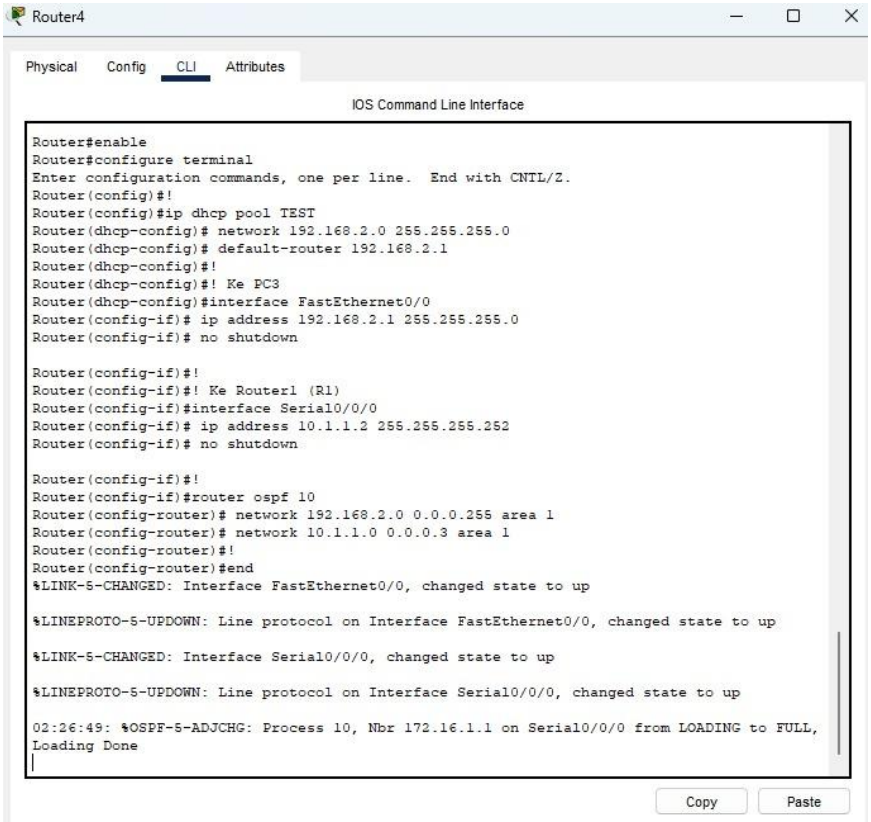
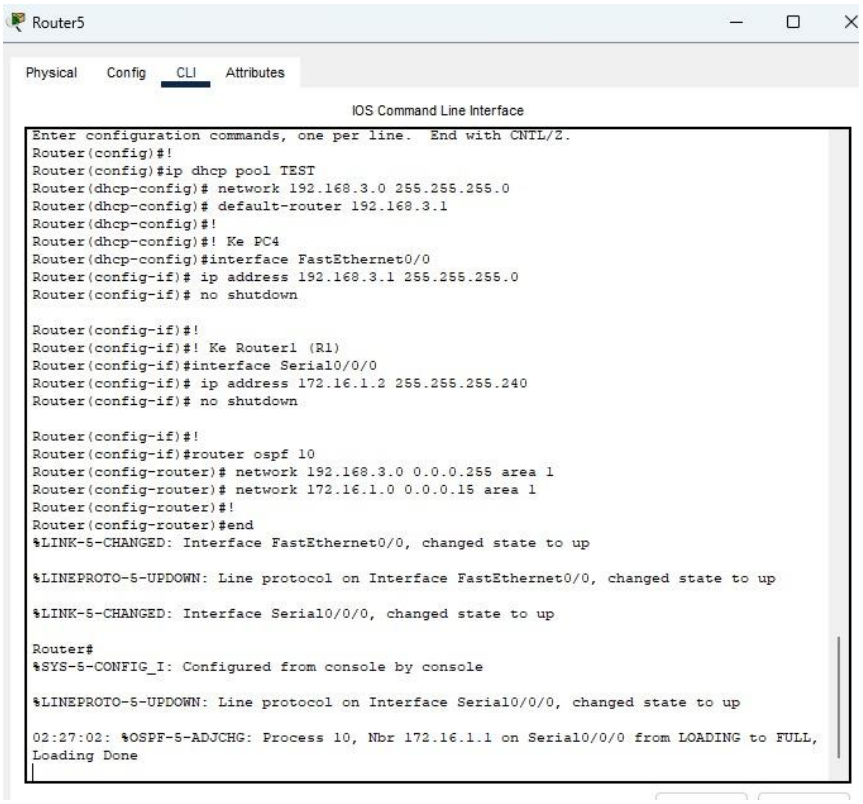
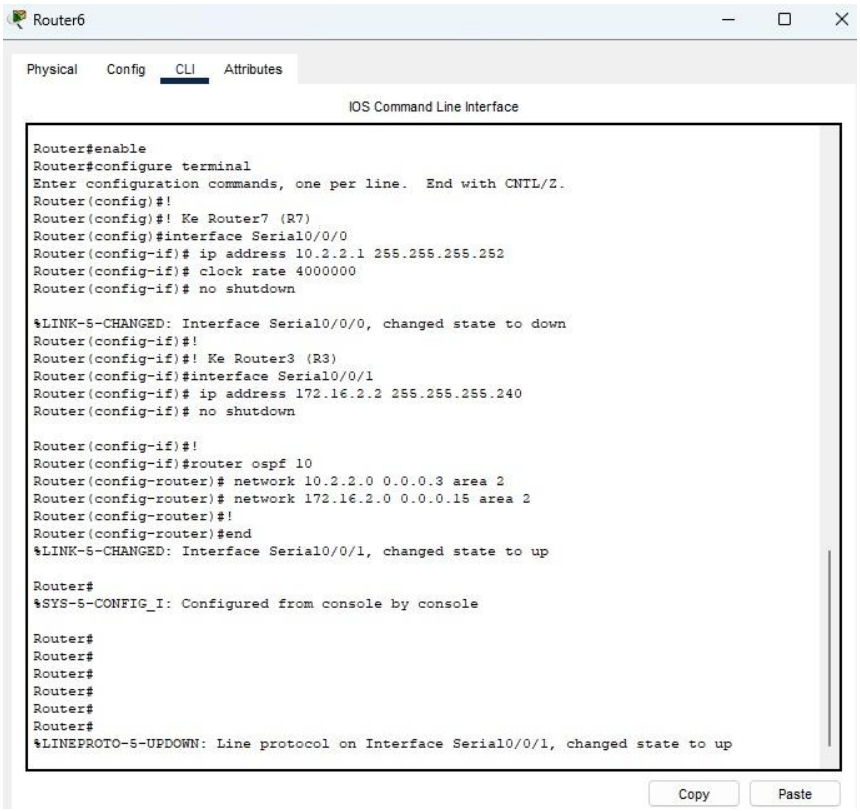
d. R4


Router4
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#!
Router(config)#ip dhcp pool TEST
Router(dhcp-config)# network 192.168.2.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.2.1
Router(dhcp-config)#!
Router(dhcp-config)#! Ke PC3
Router(dhcp-config)#interface FastEthernet0/0
Router(config-if)# ip address 192.168.2.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#! Ke Router1 (R1)
Router(config-if)#interface Serial0/0/0
Router(config-if)# ip address 10.1.1.2 255.255.255.252
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#router ospf 10
Router(config-router)# network 192.168.2.0 0.0.0.255 area 1
Router(config-router)# network 10.1.1.0 0.0.0.3 area 1
Router(config-router)#!
Router(config-router)#end
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
02:26:49: %OSPF-5-ADJCHG: Process 10, Nbr 172.16.1.1 on Serial0/0/0 from LOADING to FULL, Loading Done
Copy
Paste

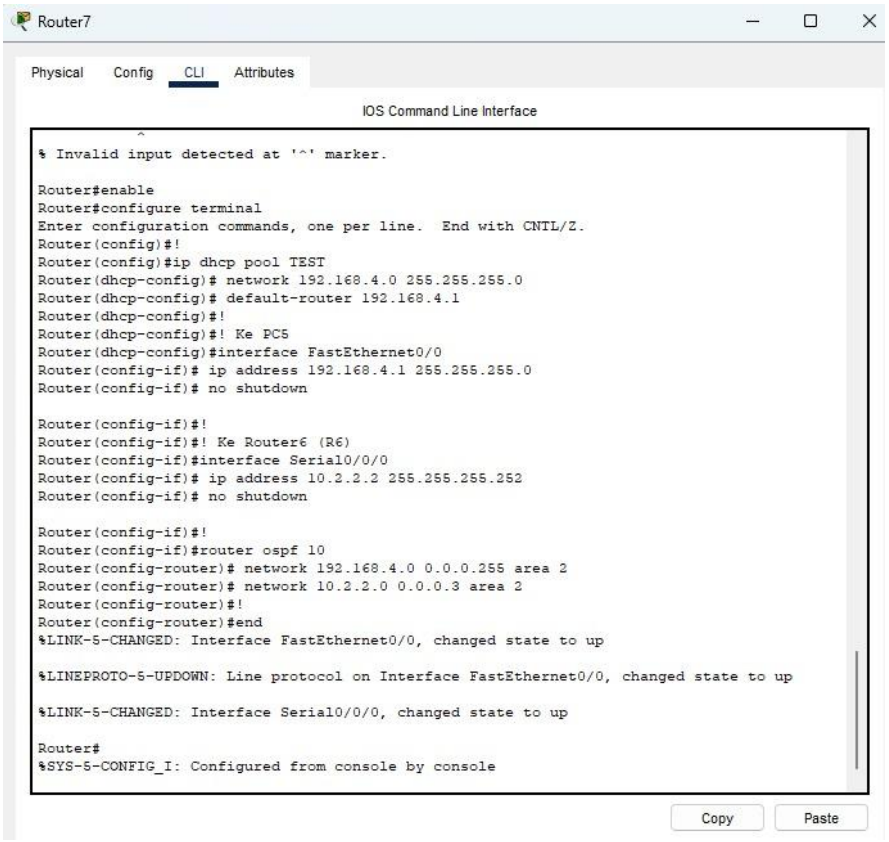
e. R5


Router5
Physical
Config
CLI
Attributes
IOS Command Line Interface
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#!
Router(config)#ip dhcp pool TEST
Router(dhcp-config)# network 192.168.3.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.3.1
Router(dhcp-config)#!
Router(dhcp-config)#! Ke PC4
Router(dhcp-config)#interface FastEthernet0/0
Router(config-if)# ip address 192.168.3.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#! Ke Router1 (R1)
Router(config-if)#interface Serial0/0/0
Router(config-if)# ip address 172.16.1.2 255.255.255.240
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#router ospf 10
Router(config-router)# network 192.168.3.0 0.0.0.255 area 1
Router(config-router)# network 172.16.1.0 0.0.0.15 area 1
Router(config-router)#!
Router(config-router)#end
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router#
%SYS-5-CONFIG_I: Configured from console by console
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
02:27:02: %OSPF-5-ADJCHG: Process 10, Nbr 172.16.1.1 on Serial0/0/0 from LOADING to FULL,
Loading Done

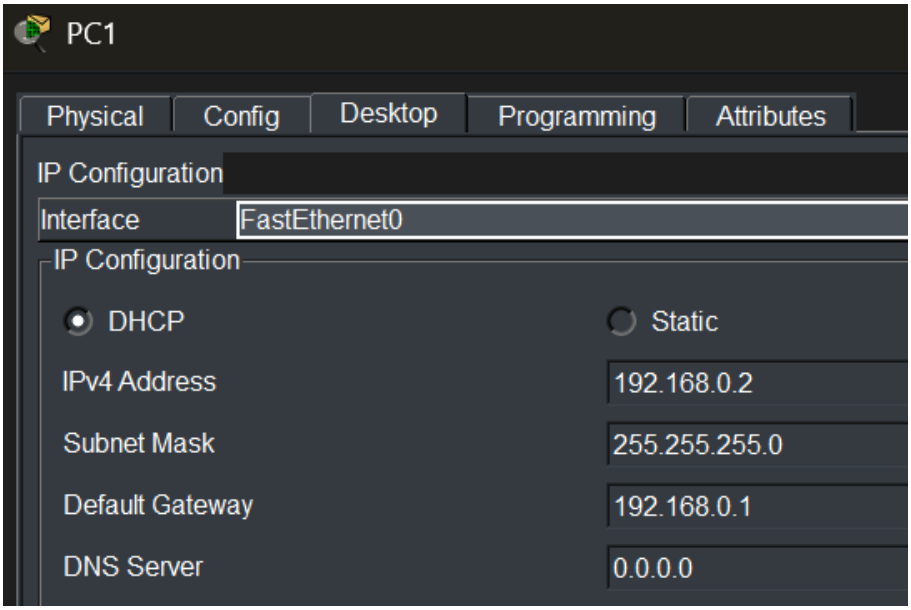
f. R6


Router6
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#!
Router(config)#! Ke Router7 (R7)
Router(config)#interface Serial0/0/0
Router(config-if)# ip address 10.2.2.1 255.255.255.252
Router(config-if)# clock rate 4000000
Router(config-if)# no shutdown
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#!
Router(config-if)#! Ke Router3 (R3)
Router(config-if)#interface Serial0/0/1
Router(config-if)# ip address 172.16.2.2 255.255.255.240
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#router ospf 10
Router(config-router)# network 10.2.2.0 0.0.0.3 area 2
Router(config-router)# network 172.16.2.0 0.0.0.15 area 2
Router(config-router)#!
Router(config-router)#end
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#
Router#
Router#
Router#
Router#
Router#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
Copy
Paste

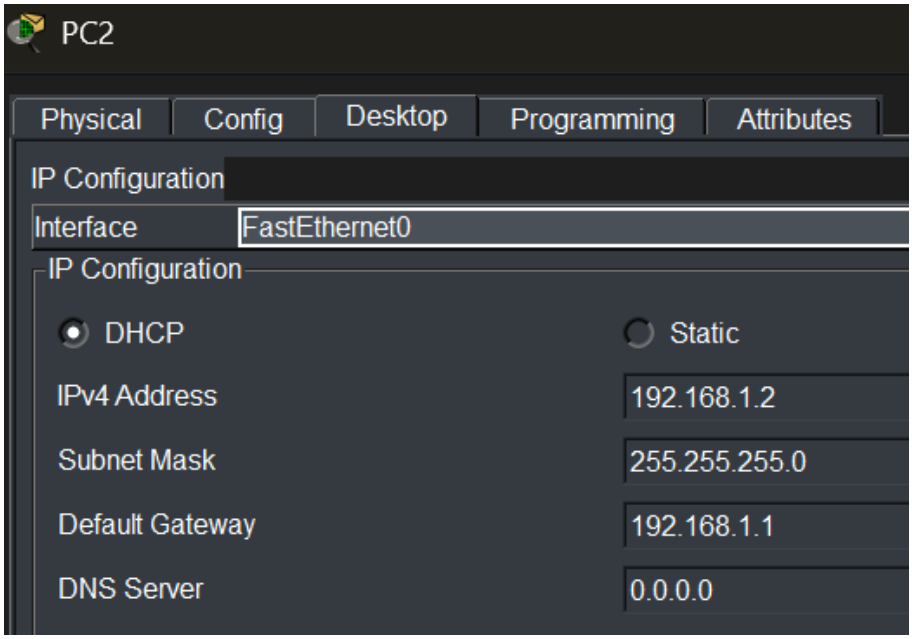
g. R7


Router7
Physical
Config
CLI
Attributes
IOS Command Line Interface
% Invalid input detected at '^' marker.
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#!
Router(config)#ip dhcp pool TEST
Router(dhcp-config)# network 192.168.4.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.4.1
Router(dhcp-config)#!
Router(dhcp-config)#! Ke PC5
Router(dhcp-config)#interface FastEthernet0/0
Router(config-if)# ip address 192.168.4.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#! Ke Router6 (R6)
Router(config-if)#interface Serial0/0/0
Router(config-if)# ip address 10.2.2.2 255.255.255.252
Router(config-if)# no shutdown
Router(config-if)#!
Router(config-if)#router ospf 10
Router(config-router)# network 192.168.4.0 0.0.0.255 area 2
Router(config-router)# network 10.2.2.0 0.0.0.3 area 2
Router(config-router)#!
Router(config-router)#end
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Router#
%SYS-5-CONFIG_I: Configured from console by console
Copy
Paste

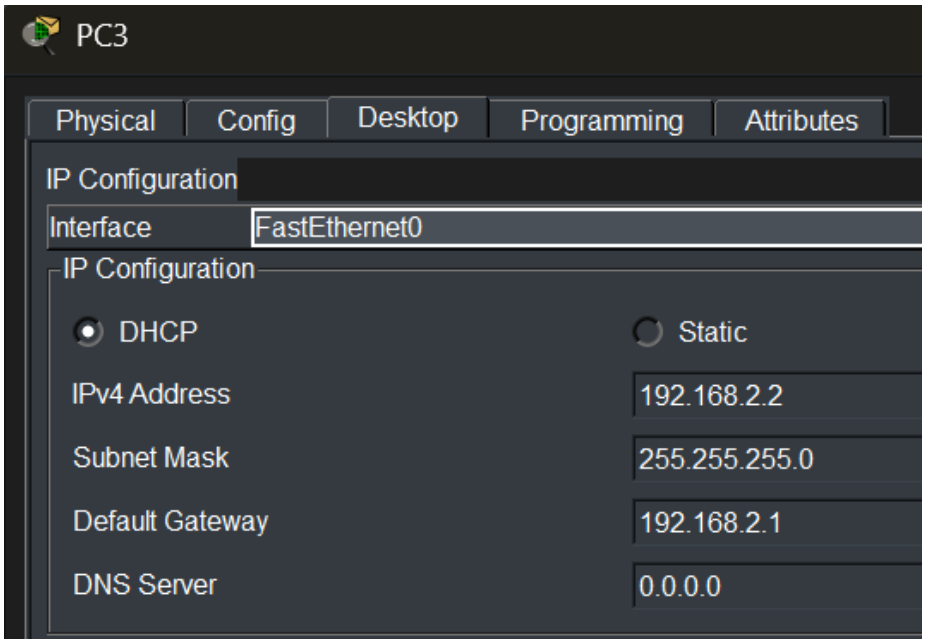
h. PC-1


PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.0.2
Subnet Mask
255.255.255.0
Default Gateway
192.168.0.1
DNS Server
0.0.0.0

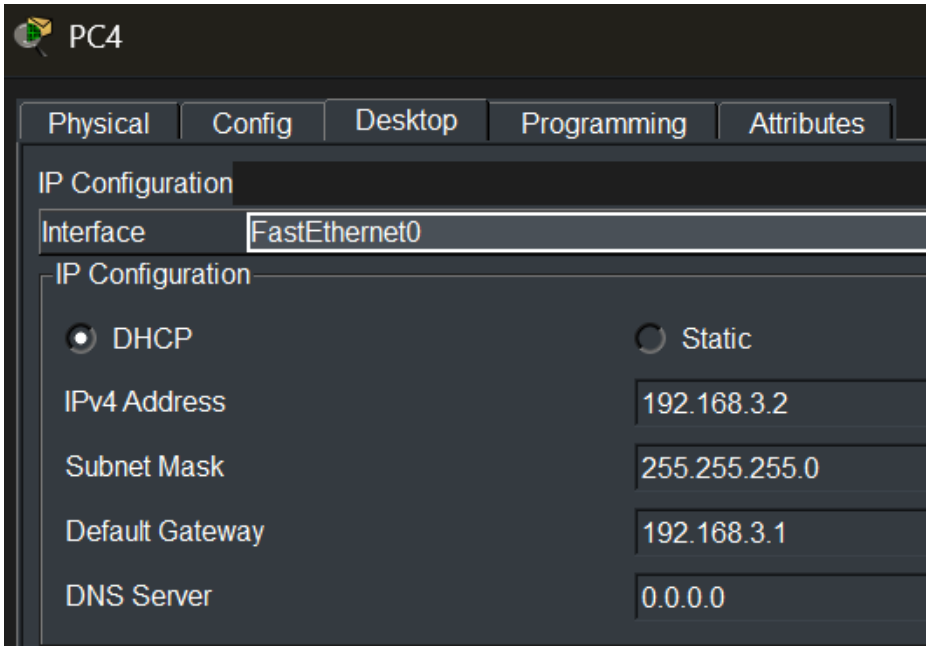
i. PC-2


PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.2
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
0.0.0.0

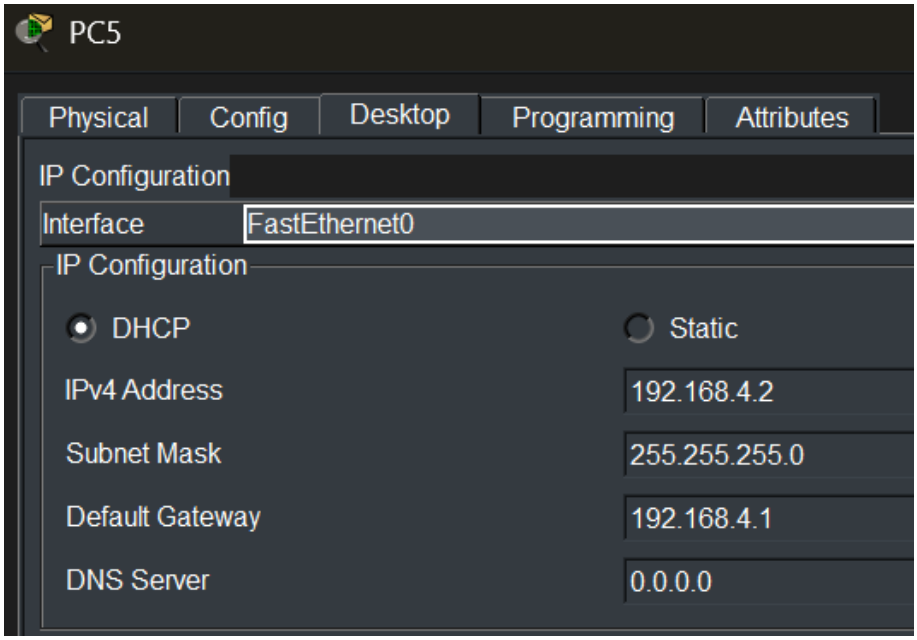
j. PC-3


PC3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.2.2
Subnet Mask
255.255.255.0
Default Gateway
192.168.2.1
DNS Server
0.0.0.0

k. PC-4



l. PC-5



3. Mengecek konektivitas

a. PC-1 ke semua PC

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC1	PC3	ICMP		0.000	N	0	(edit)	
	Successful	PC1	PC2	ICMP		0.000	N	1	(edit)	
	Successful	PC1	PC4	ICMP		0.000	N	2	(edit)	
	Successful	PC1	PC5	ICMP		0.000	N	3	(edit)	

b. PC-2 ke semua PC

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC2	PC1	ICMP		0.000	N	0	(edit)	
	Successful	PC2	PC3	ICMP		0.000	N	1	(edit)	
	Successful	PC2	PC4	ICMP		0.000	N	2	(edit)	
	Successful	PC2	PC5	ICMP		0.000	N	3	(edit)	

c. PC-3 ke semua PC

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC3	PC1	ICMP		0.000	N	0	(edit)	
	Successful	PC3	PC4	ICMP		0.000	N	1	(edit)	
	Successful	PC3	PC2	ICMP		0.000	N	2	(edit)	
	Successful	PC3	PC5	ICMP		0.000	N	3	(edit)	

d. PC-4 ke semua PC

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC4	PC3	ICMP		0.000	N	0	(edit)	
	Successful	PC4	PC1	ICMP		0.000	N	1	(edit)	
	Successful	PC4	PC2	ICMP		0.000	N	2	(edit)	
	Successful	PC4	PC5	ICMP		0.000	N	3	(edit)	

e. PC-5 ke semua PC

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC5	PC4	ICMP		0.000	N	0	(edit)	
	Successful	PC5	PC2	ICMP		0.000	N	1	(edit)	
	Successful	PC5	PC1	ICMP		0.000	N	2	(edit)	
	Successful	PC5	PC3	ICMP		0.000	N	3	(edit)	

D. Analisa

1. Implementasi Protokol: Praktikum ini berhasil mengimplementasikan dynamic routing menggunakan Multi-Area OSPF pada 7 router. Konfigurasi OSPF (terlihat pada command router ospf 10 di R1-R7) memungkinkan semua router untuk saling bertukar informasi routing secara dinamis.
2. Desain Multi-Area OSPF: Jaringan dibagi menjadi tiga area berbeda, sesuai dengan best practice OSPF:
    a. Area 0 (Backbone): Melibatkan R1, R2, dan R3.
    b. Area 1: Melibatkan R1, R4, dan R5. Dada
    c. Area 2: Melibatkan R3, R6, dan R7.
    d. Router ABR (Area Border Router): R1 (menghubungkan Area 0 and 1) dan R3 (menghubungkan Area 0 dan 2) bertindak sebagai ABR. Ini adalah desain yang valid karena semua area (Area 1 dan 2) terhubung langsung ke backbone (Area 0).
3. Analisis Tabel Routing: Tabel *routing* dari R1 hingga R7 (Sumber 28-41) secara jelas menunjukkan keberhasilan konfigurasi OSPF:
    a. Rute dengan kode "Connected" adalah jaringan yang terhubung langsung ke interface router.
    b. Rute dengan kode "OSPF" (O) adalah rute intra-area, yaitu rute yang dipelajari dari router lain yang berada di dalam area OSPF yang sama.
    c. Rute dengan kode "OSPF Inter Area" (O IA) adalah rute inter-area, yaitu rute yang dipelajari dari area OSPF lain. Rute ini disebarkan oleh ABR (R1 dan R3).
    d. Contohnya, pada R4 (di Area 1), rute menuju jaringan PC1 (192.168.0.0/24 di Area 0) dan jaringan PC5 (192.168.4.0/24 di Area 2) keduanya ditandai sebagai O IA, yang membuktikan R4 berhasil mempelajari rute dari luar areanya.
4. Konektivitas End-to-End: Hasil pengujian konektivitas menggunakan ICMP (ping) dari PC1 ke semua PC lain , PC2 ke semua PC lain , dan seterusnya, semuanya menunjukkan status "Successful". Ini membuktikan bahwa OSPF

telah berhasil membangun jalur komunikasi yang lengkap di seluruh topologi, memungkinkan paket data untuk berpindah antar *area* yang berbeda (misalnya dari PC1 di Area 0 ke PC3 di Area 1) tanpa masalah.

5. Konfigurasi Tambahan (DHCP): Router R2, R3, R4, R5, dan R7 juga berhasil dikonfigurasi sebagai server DHCP untuk memberikan alamat IP secara otomatis ke PC di LAN masing-masing, seperti yang terlihat pada konfigurasi PC1-PC5.
6. Diskrepansi Laporan: Terdapat ketidaksesuaian antara bagian Tujuan Pembelajaran (yang menyebutkan protokol RIP) dengan bagian Pendahuluan , Langkah Praktikum (konfigurasi OSPF), dan Tabel Routing yang semuanya dengan jelas mengimplementasikan OSPF. Analisis ini didasarkan pada implementasi OSPF yang sebenarnya dilakukan.

E. Kesimpulan

Praktikum konfigurasi dynamic routing Multi-Area OSPF pada 7 router telah berhasil dilaksanakan dengan sukses. Topologi jaringan berhasil dibagi menjadi tiga area (Area 0, 1, dan 2), dengan R1 dan R3 berfungsi dengan benar sebagai Area Border Router (ABR) yang menghubungkan semua area non-backbone ke backbone. Verifikasi tabel routing pada setiap router membuktikan bahwa semua perangkat telah mempelajari rute secara dinamis, baik rute intra-area (OSPF) maupun rute inter-area (OSPF Inter Area). Keberhasilan ini dikonfirmasi secara fungsional melalui pengujian konektivitas end-to-end antar semua PC, yang seluruhnya menunjukkan hasil "Successful" , menandakan bahwa seluruh jaringan telah terhubung sepenuhnya.