LAPORAN RESMI
WORKSHOP JARINGAN KOMPUTER

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PERCOBAAN 9
BORDER GATEWAY PROTOCOL (BGP)

1. TUJUAN

a. Mahasiswa memahami tentang cara kerja protokol Border Gateway.
b. Mahasiswa dapat melakukan konfigurasi protokol BGP pada cisco router.

2. DASAR TEORI

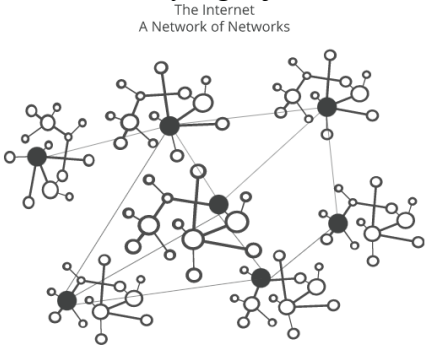
Apa itu BGP?

Border Gateway Protocol (BGP) adalah layanan pos Internet. Ketika seseorang memasukkan surat ke dalam kotak surat, Layanan Pos memproses surat itu dan memilih rute yang cepat dan efisien untuk mengirimkan surat itu ke penerimanya. Demikian pula, ketika seseorang mengirimkan data melalui Internet, BGP bertanggung jawab untuk melihat semua jalur yang tersedia yang dapat dilalui oleh data dan memilih rute terbaik, yang biasanya berarti berpindah antar sistem otonom.

BGP adalah protokol yang membuat Internet bekerja dengan mengaktifkan perutean data. Saat pengguna di Singapura memuat situs web dengan server asal di Argentina, BGP adalah protokol yang memungkinkan komunikasi itu terjadi dengan cepat dan efisien.

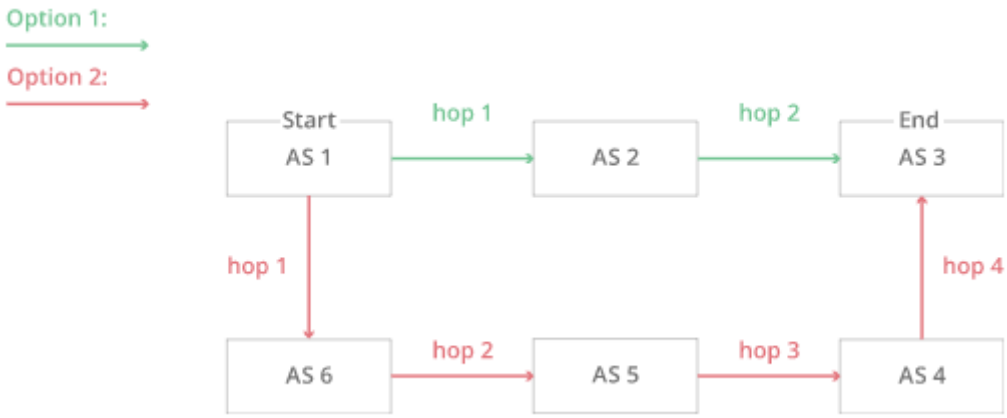
Apa itu sistem otonom?

Internet adalah jaringan dari jaringan. Itu dipecah menjadi ratusan ribu jaringan yang lebih kecil yang dikenal sebagai sistem otonom (AS). Masing-masing jaringan ini pada dasarnya adalah kumpulan besar router yang dijalankan oleh satu organisasi.



Gambar 1. Network of Network

Jika kita terus menganggap BGP sebagai Layanan Pos Internet, AS seperti cabang kantor pos individu. Sebuah kota mungkin memiliki ratusan kotak surat, tetapi surat dalam kotak tersebut harus melalui cabang pos setempat sebelum dialihkan ke tujuan lain. Router internal dalam AS seperti kotak surat. Mereka meneruskan transmisi keluar mereka ke AS, yang kemudian menggunakan perutean BGP untuk mendapatkan transmisi ini ke tujuan mereka.



Gambar 2. Diagram BGP

Diagram di atas menggambarkan versi BGP yang disederhanakan. Dalam versi ini hanya ada enam AS di Internet. Jika AS1 perlu merutekan paket ke AS3, ia memiliki dua opsi berbeda:
Melompat ke AS2 dan kemudian ke AS3:
AS2 → AS3
Atau melompat ke AS6, lalu ke AS5, AS4, dan akhirnya ke AS3:
AS6 → AS5 → AS4 → AS3

Dalam model yang disederhanakan ini, keputusannya tampak mudah. Rute AS2 membutuhkan lebih sedikit hop daripada rute AS6, dan karena itu merupakan rute tercepat dan paling efisien. Sekarang bayangkan ada ratusan ribu AS dan jumlah hop itu hanya satu bagian dari algoritma pemilihan rute yang kompleks. Itulah realitas perutean BGP di Internet.

Struktur Internet terus berubah, dengan sistem baru bermunculan dan sistem yang ada menjadi tidak tersedia. Oleh karena itu, setiap AS harus selalu up to date dengan informasi mengenai rute baru maupun rute usang. Ini dilakukan melalui sesi peering di mana setiap AS terhubung ke AS tetangga dengan koneksi TCP/IP untuk tujuan berbagi informasi perutean. Dengan menggunakan informasi ini, setiap AS dilengkapi untuk merutekan transmisi data keluar yang datang dari dalam dengan benar.

Di sinilah bagian dari analogi kita berantakan. Tidak seperti cabang kantor pos, sistem otonom tidak semuanya merupakan bagian dari organisasi yang sama. Bahkan, mereka sering menjadi bagian dari bisnis pesaing. Untuk alasan ini, rute BGP terkadang mempertimbangkan pertimbangan bisnis. ASes sering menagih satu sama lain untuk membawa lalu lintas melintasi jaringan mereka, dan harga akses dapat diperhitungkan ke dalam rute mana yang akhirnya dipilih.

Siapa yang mengoperasikan sistem otonom BGP?

AS biasanya dimiliki oleh penyedia layanan Internet (ISP) atau organisasi besar lainnya, seperti perusahaan teknologi, universitas, lembaga pemerintah, dan lembaga ilmiah. Setiap AS yang ingin bertukar informasi perutean harus memiliki nomor sistem otonom terdaftar (ASN). Internet Assigned Numbers Authority (IANA) menetapkan ASN ke Regional Internet Registries (RIR), yang kemudian menetapkannya ke ISP dan jaringan. ASN adalah nomor 16 bit antara satu dan 65534 dan 32 bit nomor antara

131072 dan 4294967294. Pada 2018, ada sekitar 64.000 ASN yang digunakan di seluruh dunia. ASN ini hanya diperlukan untuk BGP eksternal.

Apa perbedaan antara BGP eksternal dan BGP internal?

Rute dipertukarkan dan lalu lintas ditransmisikan melalui Internet menggunakan BGP eksternal (eBGP). Sistem otonom juga dapat menggunakan versi internal BGP untuk merutekan melalui jaringan internalnya, yang dikenal sebagai BGP internal (iBGP). Perlu dicatat bahwa menggunakan BGP internal BUKAN merupakan persyaratan untuk menggunakan BGP eksternal. Sistem otonom dapat memilih dari sejumlah protokol internal untuk menghubungkan router di jaringan internal mereka.

BGP eksternal seperti pelayaran internasional. Ada standar dan pedoman tertentu yang perlu diikuti saat mengirim surat ke luar negeri. Setelah surat itu mencapai negara tujuan, ia harus melalui layanan surat lokal negara tujuan untuk mencapai tujuan akhirnya. Setiap negara memiliki layanan surat internalnya sendiri yang tidak selalu mengikuti pedoman yang sama dengan yang ada di negara lain. Demikian pula, setiap sistem otonom dapat memiliki protokol perutean internalnya sendiri untuk merutekan data dalam jaringannya sendiri.

Kelemahan BGP dan cara mengatasinya

Pada tahun 2004, ISP Turki bernama TTNet secara tidak sengaja mengiklankan rute BGP yang salah ke tetangganya. Rute-rute ini mengklaim bahwa TTNet sendiri adalah tujuan terbaik untuk semua lalu lintas di Internet. Ketika rute-rute ini menyebar lebih jauh dan lebih jauh ke sistem yang lebih otonom, gangguan besar-besaran terjadi, menciptakan krisis satu hari di mana banyak orang di seluruh dunia tidak dapat mengakses sebagian atau seluruh Internet.

Demikian pula, pada tahun 2008, ISP Pakistan mencoba menggunakan rute BGP untuk memblokir pengguna Pakistan agar tidak mengunjungi YouTube. ISP kemudian secara tidak sengaja mengiklankan rute-rute ini dengan AS tetangganya dan rute tersebut dengan cepat menyebar ke seluruh jaringan BGP Internet. Rute ini membuat pengguna yang mencoba mengakses YouTube menemui jalan buntu, yang mengakibatkan YouTube tidak dapat diakses selama beberapa jam.

Ini adalah contoh praktik yang disebut pembajakan BGP, yang tidak selalu terjadi secara tidak sengaja. Pada April 2018, penyerang dengan sengaja membuat rute BGP yang buruk untuk mengalihkan lalu lintas yang dimaksudkan untuk layanan DNS Amazon. Para penyerang mampu mencuri cryptocurrency senilai lebih dari $ 100.000 dengan mengarahkan lalu lintas ke diri mereka sendiri.

Insiden seperti ini dapat terjadi karena fungsi berbagi rute BGP bergantung pada kepercayaan, dan sistem otonom secara implisit mempercayai rute yang dibagikan dengan mereka. Ketika rekan-rekan mengumumkan informasi rute yang salah (sengaja atau tidak), lalu lintas berjalan di tempat yang tidak seharusnya, berpotensi dengan hasil yang berbahaya.

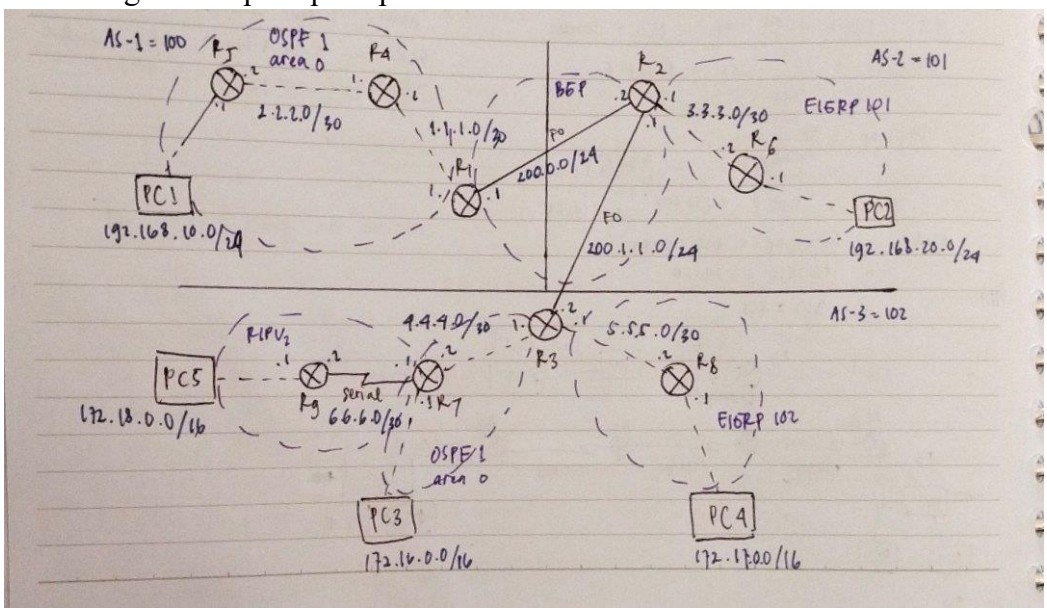
Untungnya, beberapa kemajuan telah dibuat dalam mengamankan BGP. Terutama, kerangka keamanan untuk perutean yang disebut Resource Public Key Infrastructure (RPKI) diperkenalkan pada tahun 2008. RPKI menggunakan catatan yang ditandatangani secara kriptografis yang disebut Route Origin Authorization (ROA) untuk memvalidasi operator jaringan mana yang diizinkan untuk

mengumumkan alamat IP organisasi menggunakan BGP. Ini memastikan bahwa hanya pihak yang berwenang yang mengumumkan awalan organisasi.

Namun keberadaan RPKI saja tidak cukup. Jika jaringan besar tidak menyebarkan RPKI, mereka dapat menyebarkan serangan pembajakan skala besar. Saat ini, lebih dari 50% penyedia Internet teratas mendukung RPKI sampai batas tertentu, tetapi mayoritas yang lebih besar diperlukan untuk mengamankan BGP sepenuhnya. Operator jaringan dapat melindungi jaringan mereka dengan menerapkan RPKI dan menggunakan teknologi peringatan jaringan seperti Deteksi Kebocoran Rute Cloudflare. Fitur ini membantu mencegah serangan pembajakan BGP dengan memberi tahu pelanggan saat pihak yang tidak berwenang mengiklankan awalan mereka.

3. LANGKAH-LANGKAH

a) Buat Rangkaian seperti pada perencanaan dibawah ini.



b) Lakukan Konfigurasi setiap router.

- R1

```
R1(config)#int gig0/0
R1(config-if)#ip add 1.1.1.1 255.255.255.252
R1(config-if)#no shu

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ex
R1(config)#int gig0/0/0
R1(config-if)#ip add 200.0.0.1 255.255.255.0
R1(config-if)#no shu

%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to down
R1(config-if)#ex
```

```
R1#ping 200.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.0.0.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

R1#ping 1.1.1.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.1.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

```
R1(config)#router ospf 1
R1(config-router)#network 1.1.1.0 255.255.255.252
% Incomplete command.
R1(config-router)#network 1.1.1.0 255.255.255.252 area 0
R1(config-router)#
01:00:35: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.1 on GigabitEthernet0/0 from LOADING to
FULL, Loading Done
```

```
R1(config)#router bgp ?
  <1-65535>  Autonomous system number
R1(config)#router bgp 100
R1(config-router)#network 200.0.0.0?
A.B.C.D
R1(config-router)#network 200.0.0.0 255.255.255.0
                                    ^
% Invalid input detected at '^' marker.

R1(config-router)#network 200.0.0.0 mask 255.255.255.0
R1(config-router)#
```

```
R1(config)#router bgp 100
R1(config-router)#redistribute ospf ?
  <1-65535>  Process ID
R1(config-router)#redistribute ospf 1 ?
  match  Redistribution of OSPF routes
  <cr>
R1(config-router)#redistribute ospf 1
R1(config-router)#ex
R1(config)#router ospf 1
R1(config-router)#redistribute bgp 100 ?
  metric       Metric for redistributed routes
  metric-type  OSPF/IS-IS exterior metric type for redistributed routes
  subnets      Consider subnets for redistribution into OSPF
  tag          Set tag for routes redistributed into OSPF
  <cr>
R1(config-router)#redistribute bgp 100 subnets
R1(config-router)#ex
R1(config)#
```

```
R1(config)#router bgp 100
R1(config-router)#nei
R1(config-router)#neighbor 200.0.0.2 remote-as 101
R1(config-router)#ex
R1(config)#
```

- R2

```
R2(config)#int gig0/0/0
R2(config-if)#ip add 200.0.0.2 255.255.255.0
R2(config-if)#no shu

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
ex
R2(config)#int gig0/1/0
R2(config-if)#ip add 200.1.1.1 255.255.255.0
R2(config-if)#no shu

%LINK-5-CHANGED: Interface GigabitEthernet0/1/0, changed state to down
R2(config-if)#ex
R2(config)#int gig0/0
R2(config-if)#ip add 3.3.3.1 255.255.255.252
R2(config-if)#no shu

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
ex
R2(config)#
```

```
R2#ping 200.0.0.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.0.0.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

R2#ping 200.1.1.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.1.1.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

R2#ping 3.3.3.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 3.3.3.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
```

```
R2(config)#router bgp 101
R2(config-router)#network 200.0.0.0 mask 255.255.255.0
R2(config-router)#network 200.1.1.0 mask 255.255.255.0
R2(config-router)#ex
R2(config)#router eigrp ?
  <1-65535>  Autonomous system number
R2(config)#router eigrp 101
R2(config-router)#network 3.3.3.0 ?
  A.B.C.D  EIGRP wild card bits
  <cr>
R2(config-router)#network 3.3.3.0 0.0.0.3
R2(config-router)#ex
R2(config)#
```

```
R2(config)#router eigrp 101
R2(config-router)#no auto-summary
R2(config-router)#ex
R2(config)#
```

```
R2(config)#router bgp 101
R2(config-router)#redistribute eigrp 101
R2(config-router)#ex
R2(config)#router eigrp 101
R2(config-router)#redistribute bgp 101 metric ?
  <1-4294967295>  Bandwidth metric in Kbits per second
R2(config-router)#redistribute bgp 101 metric 1000000 ?
  <0-4294967295>  EIGRP delay metric, in 10 microsecond units
R2(config-router)#redistribute bgp 101 metric 1000000 1 ?
  <0-255>  EIGRP reliability metric where 255 is 100% reliable
R2(config-router)#redistribute bgp 101 metric 1000000 1 255 ?
  <1-255>  EIGRP Effective bandwidth metric (Loading) where 255 is 100% loaded
R2(config-router)#redistribute bgp 101 metric 1000000 1 255 1 ?
  <1-65535>  EIGRP MTU of the path
R2(config-router)#redistribute bgp 101 metric 1000000 1 255 1 1500 ?
  <cr>
R2(config-router)#redistribute bgp 101 metric 1000000 1 255 1 1500
R2(config-router)#ex
R2(config)#
```

```
R2(config)#router bgp 101
R2(config-router)#ne
R2(config-router)#nei
R2(config-router)#neighbor 200.1.1.2 remote-as 102
R2(config-router)#neighbor 200.0.0.1 remote-as 100
R2(config-router)#%BGP-5-ADJCHANGE: neighbor 200.0.0.1 Up

R2(config-router)#ex
R2(config)#
```

- R3

```
R3(config)#int gig0/0/0
R3(config-if)#ip add 200.1.1.2 255.255.255.0
R3(config-if)#no shu

R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
ex
R3(config)#int gig0/0
R3(config-if)#ip add 5.5.5.1 255.255.255.252
R3(config-if)#no shu

R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
ex
R3(config)#int gig0/1
R3(config-if)#ip add 4.4.4.1 255.255.255.252
R3(config-if)#no shu

R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
ex
R3(config)#
```

```
R3#ping 4.4.4.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 4.4.4.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

R3#ping 5.5.5.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 5.5.5.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

R3#ping 200.1.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 200.1.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

```
R3(config)#router bgp 102
R3(config-router)#network 200.1.1.0 ?
  mask  Network mask
  <cr>
R3(config-router)#network 200.1.1.0 mask 255.255.255.0
R3(config-router)#ex
R3(config)#router ospf 1
R3(config-router)#network 4.4.4.0 255.255.255.252
% Incomplete command.
R3(config-router)#network 4.4.4.0 255.255.255.252 area 0
R3(config-router)#ex
R3(config)#router eigrp 1
01:09:27: %OSPF-5-ADJCHG: Process 1, Nbr 172.16.0.1 on GigabitEthernet0/1 from LOADING to
FULL,
R3(config)#router eigrp 102
R3(config-router)#network 5.5.5.0 0.0.0.3
R3(config-router)#ex
R3(config)#
```

```
R3(config)#router eigrp 102
R3(config-router)#no auto-summary
R3(config-router)#ex
R3(config)#
```

```
R3(config)#router bgp 102
R3(config-router)#redistribute eigrp 102
R3(config-router)#redistribute ospf 1
R3(config-router)#ex
R3(config)#router ospf 1
R3(config-router)#redistribute bgp 102 subnets
R3(config-router)#ex
R3(config)#router eigrp
% Incomplete command.
R3(config)#router eigrp 102
R3(config-router)#redistribute bgp 102 metric 1000000 1 255 1 1500
R3(config-router)#ex
R3(config)#
```

```
R3(config)#router ospf 1
R3(config-router)#redistribute eigrp 102
% Only classful networks will be redistributed
R3(config-router)#redistribute eigrp 102 ?
  metric       Metric for redistributed routes
  metric-type  OSPF/IS-IS exterior metric type for redistributed routes
  subnets      Consider subnets for redistribution into OSPF
  tag          Set tag for routes redistributed into OSPF
  <cr>
R3(config-router)#redistribute eigrp 102 subnets
R3(config-router)#ex
R3(config)#
```

```
R3(config)#router bgp 102
R3(config-router)#nei
R3(config-router)#neighbor 200.0.0.1 re
R3(config-router)#no neighbor 200.0.0.1 remote-as 101
R3(config-router)#ex
```

- R4

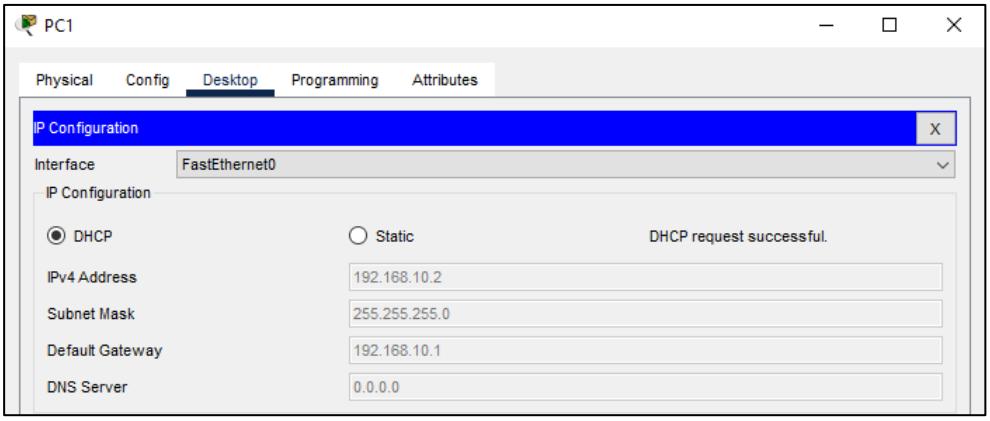
```
R4(config)#int gig0/1
R4(config-if)#ip add 2.2.2.1 255.255.255.252
R4(config-if)#no shu

R4(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
ex
R4(config)#int gig0/0
R4(config-if)#ip add 1.1.1.2 255.255.255.252
R4(config-if)#no shu
R4(config-if)#no shutdown

R4(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
ex
R4(config)#
```

```
R4#ping 2.2.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/7/16 ms

R4#ping 1.1.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.1.1.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
```

```
R4(config)#router ospf 1
R4(config-router)#network 2.2.2.0 255.255.255.252 area 0
R4(config-router)#
00:53:18: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.1 on GigabitEthernet0/1 from LOADING
to FULL, Loading Done

R4(config-router)#network 1.1.1.0 255.255.255.252 area 0
R4(config-router)#ex
R4(config)#
```

- R5

```
R5(config)#int gig0/0
R5(config-if)#ip add 192.168.10.1 255.255.255.0
R5(config-if)#no shu

R5(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ex
R5(config)#int gig0/1
R5(config-if)#ip add 2.2.2.2 255.255.255.252
R5(config-if)#no shu

R5(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
ex
R5(config)#ip dhcp pool NET1
R5(dhcp-config)#network 192.168.10.0 255.255.255.0
R5(dhcp-config)#default-router 192.168.10.1
R5(dhcp-config)#ex
R5(config)#
```

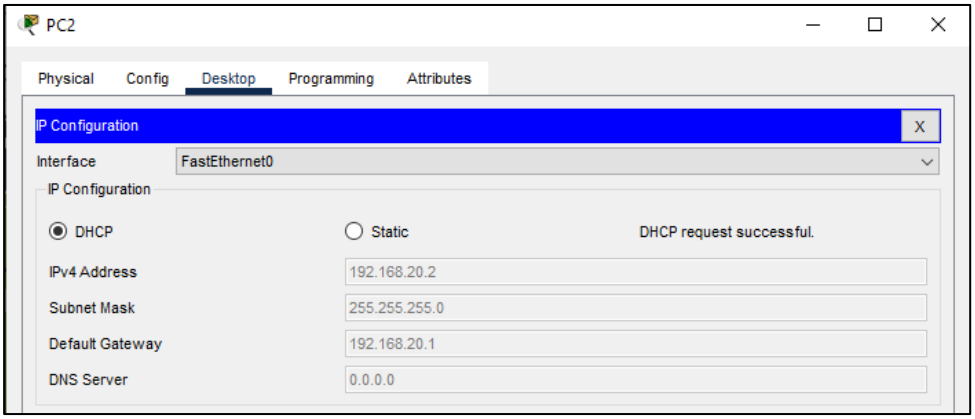



```
R5#ping 192.168.10.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.10.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

R5#ping 2.2.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
```

```
R5(config)#router ospf 1
R5(config-router)#network 192.168.10.0 255.255.255.0 area 0
R5(config-router)#network 2.2.2.0 255.255.255.252 area 0
R5(config-router)#ex
R5(config)#
```

- R6

```
R6(config)#int gig0/0
R6(config-if)#ip add 3.3.3.2 255.255.255.252
R6(config-if)#no shu

R6(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ex
R6(config)#int gig0/1
R6(config-if)#ip add 192.168.20.1 255.255.255.0
R6(config-if)#no shu

R6(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
ex
R6(config)#ip dhcp pool NET2
R6(dhcp-config)#network 192.168.20.0 255.255.255.0
R6(dhcp-config)#defa
R6(dhcp-config)#default-router 192.168.20.1
R6(dhcp-config)#ex
R6(config)#
```




```
R6#ping 192.168.20.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.20.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

R6#ping 3.3.3.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 3.3.3.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

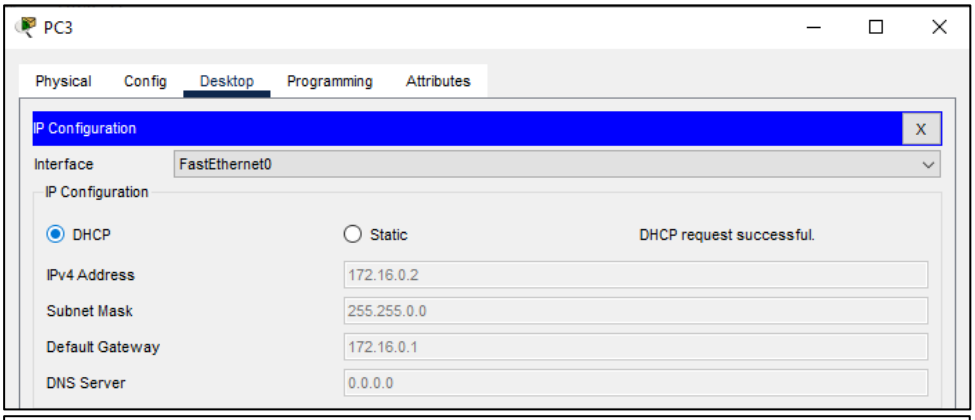
```
R6(config)#router eigrp 101
R6(config-router)#network 3.3.3.0 0.0.0.3
R6(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 101: Neighbor 3.3.3.1 (GigabitEthernet0/0) is up: new
adjacency

R6(config-router)#network 192.168.20.0 0.0.0.255
R6(config-router)#ex
R6(config)#
```

- R7

```
R7(config)#int gig0/0
R7(config-if)#ip add 4.4.4.2 255.255.255.252
R7(config-if)#no shu

R7(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ex
R7(config)#int gig0/1
R7(config-if)#ip add 172.16.0.1 255.255.0.0
R7(config-if)#no shu

R7(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
ex
R7(config)#int se0/0/0
R7(config-if)#ip add 6.6.6.1 255.255.255.252
R7(config-if)#clock rate ?
Speed (bits per second
```

```
R7(config-if)#clock rate 2000000
R7(config-if)#no shu

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R7(config-if)#ex
R7(config)#
```

```
R7(config)#ip dhcp pool NET4
R7(dhcp-config)#network 172.16.0.0 255.255.0.0
R7(dhcp-config)#def
R7(dhcp-config)#default-router 172.16.0.1
R7(dhcp-config)#ex
R7(config)#
```



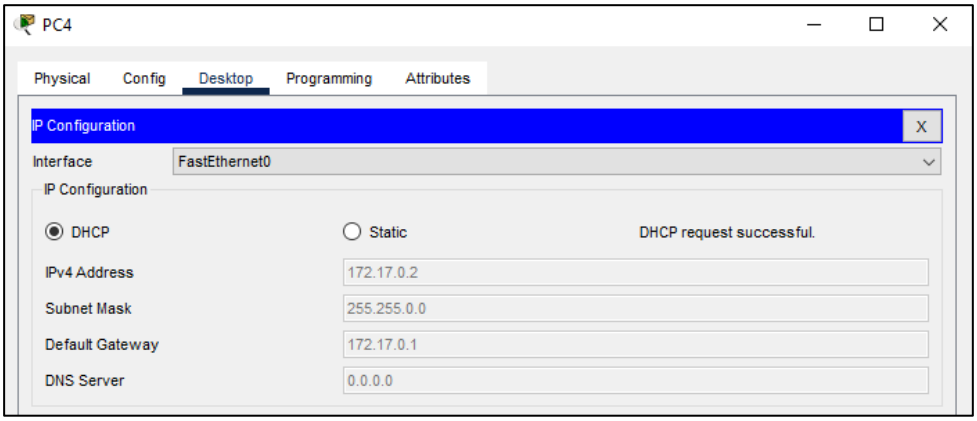

```
R7#ping 172.16.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.0.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

R7#ping 4.4.4.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 4.4.4.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

R7#ping 6.6.6.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 6.6.6.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 11/22/42 ms
```

```
R7(config)#router ospf 1
R7(config-router)#network 4.4.4.0 255.255.255.252 area 0
R7(config-router)#network 172.16.0.0 255.255.0.0 area 0
R7(config-router)#ex
R7(config)#router rip
R7(config-router)#ver 2
R7(config-router)#network 6.6.6.0 ?
  <cr>
R7(config-router)#network 6.6.6.0
R7(config-router)#network 172.18.0.0
R7(config-router)#ex
R7(config-router)#exit
R7(config)#
```

```
R7(config)#router rip
R7(config-router)#redistribute ospf 1
```

- R8

```
R8(config)#int gig0/0
R8(config-if)#ip add 5.5.5.2 255.255.255.252
R8(config-if)#no shu

R8(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ex
R8(config)#int gig0/1
R8(config-if)#ip add 172.17.0.1 255.255.0.0
R8(config-if)#no shu

R8(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
ex
R8(config)#ip dhcp pool NET3
R8(dhcp-config)#network 172.17.0.0 255.255.0.0
R8(dhcp-config)#de
R8(dhcp-config)#default-router 172.17.0.1
R8(dhcp-config)#ex
R8(config)#
```



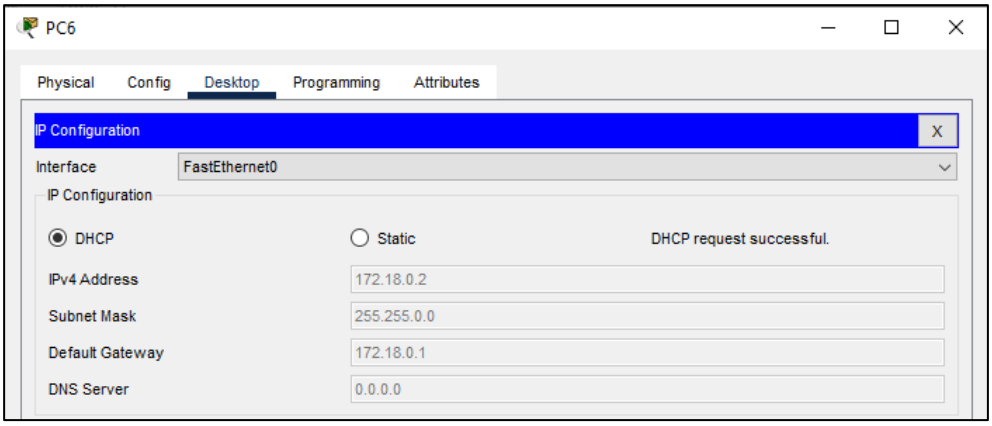

```
R8(config)#do ping 172.17.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.17.0.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

R8(config)#do ping 5.5.5.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 5.5.5.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

R8(config)#
```

```
R8(config)#router eigrp 102
R8(config-router)#network 5.5.5.0 0.0.0.3
R8(config-router)#
%DUAL-5-NBRCHANGE: IP-EIGRP 102: Neighbor 5.5.5.1 (GigabitEthernet0/0) is up: new
adjacency

R8(config-router)#network 172.17.0.0 0.0.255.255
R8(config-router)#ex
R8(config)#
```

```
R8(config)#router eigrp 102
R8(config-router)#no auto-summary
R8(config-router)#ex
R8(config)#
```

- R9

```
R9(config)#int se0/0/0
R9(config-if)#ip add 6.6.6.2 255.255.255.252
R9(config-if)#no shu

R9(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
ex
R9(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R9(config)#int gig0/0
R9(config-if)#ip add 172.18.0.1 255.255.0.0
R9(config-if)#no shu

R9(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
ex
R9(config)#ip dhcp pool NET5
R9(dhcp-config)#network 172.18.0.0 255.255.0.0
R9(dhcp-config)#deafult-
R9(dhcp-config)#def
R9(dhcp-config)#default-router 172.18.0.1
R9(dhcp-config)#ex
R9(config)#
```




```
R9#ping 6.6.6.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 6.6.6.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 10/12/22 ms

R9#ping 172.18.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.18.0.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
```

```
R9(config)#router rip
R9(config-router)#ve
R9(config-router)#version 2
R9(config-router)#network 6.6.6.0
R9(config-router)#network 172.18.0.0
R9(config-router)#ex
R9(config)#
```

c) Cek Koneksi Antar PC
d) Catat hasil dari pengecekan koneksi dengan menggunakan command ping dan tracert.
e) Lakukan analisa dari hasil-hasil tersebut.

4. HASIL PERCOBAAN

a. Tabel Routing

- R1

```
R1#show ip route
Codes: L - local, C - connected, S - static, 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

     1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       1.1.1.0/30 is directly connected, GigabitEthernet0/0
L       1.1.1.1/32 is directly connected, GigabitEthernet0/0
     2.0.0.0/30 is subnetted, 1 subnets
O       2.2.2.0/30 [110/2] via 1.1.1.2, 01:53:08, GigabitEthernet0/0
     3.0.0.0/30 is subnetted, 1 subnets
B       3.3.3.0/30 [20/2816] via 200.0.0.2, 00:00:00
     4.0.0.0/30 is subnetted, 1 subnets
B       4.4.4.0/30 [20/0] via 200.0.0.2, 00:00:00
     5.0.0.0/30 is subnetted, 1 subnets
B       5.5.5.0/30 [20/0] via 200.0.0.2, 00:00:00
     6.0.0.0/30 is subnetted, 1 subnets
B       6.6.6.0/30 [20/0] via 200.0.0.2, 00:00:00
B    172.16.0.0/16 [20/0] via 200.0.0.2, 00:00:00
B    172.17.0.0/16 [20/0] via 200.0.0.2, 00:00:00
B    172.18.0.0/16 [20/0] via 200.0.0.2, 00:00:00
O    192.168.10.0/24 [110/3] via 1.1.1.2, 01:53:08, GigabitEthernet0/0
B    192.168.20.0/24 [20/5376] via 200.0.0.2, 00:00:00
     200.0.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       200.0.0.0/24 is directly connected, GigabitEthernet0/0/0
L       200.0.0.1/32 is directly connected, GigabitEthernet0/0/0
B    200.1.1.0/24 [20/0] via 200.0.0.2, 00:00:00
```

- R2

```
Gateway of last resort is not set

     1.0.0.0/30 is subnetted, 1 subnets
B       1.1.1.0/30 [20/20] via 200.0.0.1, 00:00:00
     2.0.0.0/30 is subnetted, 1 subnets
B       2.2.2.0/30 [20/2] via 200.0.0.1, 00:00:00
     3.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       3.3.3.0/30 is directly connected, GigabitEthernet0/0
L       3.3.3.1/32 is directly connected, GigabitEthernet0/0
     4.0.0.0/30 is subnetted, 1 subnets
B       4.4.4.0/30 [20/0] via 200.1.1.2, 00:00:00
     5.0.0.0/30 is subnetted, 1 subnets
B       5.5.5.0/30 [20/0] via 200.1.1.2, 00:00:00
     6.0.0.0/30 is subnetted, 1 subnets
B       6.6.6.0/30 [20/20] via 200.1.1.2, 00:00:00
B    172.16.0.0/16 [20/2] via 200.1.1.2, 00:00:00
B    172.17.0.0/16 [20/5376] via 200.1.1.2, 00:00:00
B    172.18.0.0/16 [20/20] via 200.1.1.2, 00:00:00
B    192.168.10.0/24 [20/3] via 200.0.0.1, 00:00:00
D    192.168.20.0/24 [90/5376] via 3.3.3.2, 01:44:41, GigabitEthernet0/0
     200.0.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       200.0.0.0/24 is directly connected, GigabitEthernet0/0/0
L       200.0.0.2/32 is directly connected, GigabitEthernet0/0/0
     200.1.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       200.1.1.0/24 is directly connected, GigabitEthernet0/1/0
L       200.1.1.1/32 is directly connected, GigabitEthernet0/1/0

R2#
```

- R3

```
R3#show ip route
Codes: L - local, C - connected, S - static, 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

     1.0.0.0/30 is subnetted, 1 subnets
B       1.1.1.0/30 [20/0] via 200.1.1.1, 00:00:00
     2.0.0.0/30 is subnetted, 1 subnets
B       2.2.2.0/30 [20/0] via 200.1.1.1, 00:00:00
     3.0.0.0/30 is subnetted, 1 subnets
B       3.3.3.0/30 [20/2816] via 200.1.1.1, 00:00:00
     4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       4.4.4.0/30 is directly connected, GigabitEthernet0/1
L       4.4.4.1/32 is directly connected, GigabitEthernet0/1
     5.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       5.5.5.0/30 is directly connected, GigabitEthernet0/0
L       5.5.5.1/32 is directly connected, GigabitEthernet0/0
     6.0.0.0/30 is subnetted, 1 subnets
O E2    6.6.6.0/30 [110/20] via 4.4.4.2, 01:34:07, GigabitEthernet0/1
O    172.16.0.0/16 [110/2] via 4.4.4.2, 01:35:17, GigabitEthernet0/1
D    172.17.0.0/16 [90/5376] via 5.5.5.2, 01:37:09, GigabitEthernet0/0
O E2 172.18.0.0/16 [110/20] via 4.4.4.2, 01:32:00, GigabitEthernet0/1
B    192.168.10.0/24 [20/0] via 200.1.1.1, 00:00:00
B    192.168.20.0/24 [20/5376] via 200.1.1.1, 00:00:00
B    200.0.0.0/24 [20/0] via 200.1.1.1, 00:00:00
     200.1.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       200.1.1.0/24 is directly connected, GigabitEthernet0/0/0
L       200.1.1.2/32 is directly connected, GigabitEthernet0/0/0
```

- R4

```
Gateway of last resort is not set

     1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       1.1.1.0/30 is directly connected, GigabitEthernet0/0
L       1.1.1.2/32 is directly connected, GigabitEthernet0/0
     2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       2.2.2.0/30 is directly connected, GigabitEthernet0/1
L       2.2.2.1/32 is directly connected, GigabitEthernet0/1
     3.0.0.0/30 is subnetted, 1 subnets
O E2    3.3.3.0/30 [110/20] via 1.1.1.1, 00:45:49, GigabitEthernet0/0
     4.0.0.0/30 is subnetted, 1 subnets
O E2    4.4.4.0/30 [110/20] via 1.1.1.1, 00:27:26, GigabitEthernet0/0
     5.0.0.0/30 is subnetted, 1 subnets
O E2    5.5.5.0/30 [110/20] via 1.1.1.1, 00:27:26, GigabitEthernet0/0
     6.0.0.0/30 is subnetted, 1 subnets
O E2    6.6.6.0/30 [110/20] via 1.1.1.1, 00:27:26, GigabitEthernet0/0
O E2 172.16.0.0/16 [110/20] via 1.1.1.1, 00:27:26, GigabitEthernet0/0
O E2 172.17.0.0/16 [110/20] via 1.1.1.1, 00:27:26, GigabitEthernet0/0
O E2 172.18.0.0/16 [110/20] via 1.1.1.1, 00:27:26, GigabitEthernet0/0
O    192.168.10.0/24 [110/2] via 2.2.2.2, 01:56:14, GigabitEthernet0/1
O E2 192.168.20.0/24 [110/20] via 1.1.1.1, 00:45:49, GigabitEthernet0/0
O E2 200.0.0.0/24 [110/20] via 1.1.1.1, 01:47:49, GigabitEthernet0/0
O E2 200.1.1.0/24 [110/20] via 1.1.1.1, 00:27:49, GigabitEthernet0/0

R4#
```

- R5

```
R5#show ip route
Codes: L - local, C - connected, S - static, 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

     1.0.0.0/30 is subnetted, 1 subnets
O       1.1.1.0/30 [110/2] via 2.2.2.1, 01:58:16, GigabitEthernet0/1
     2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       2.2.2.0/30 is directly connected, GigabitEthernet0/1
L       2.2.2.2/32 is directly connected, GigabitEthernet0/1
     3.0.0.0/30 is subnetted, 1 subnets
O E2    3.3.3.0/30 [110/20] via 2.2.2.1, 00:48:52, GigabitEthernet0/1
     4.0.0.0/30 is subnetted, 1 subnets
O E2    4.4.4.0/30 [110/20] via 2.2.2.1, 00:30:29, GigabitEthernet0/1
     5.0.0.0/30 is subnetted, 1 subnets
O E2    5.5.5.0/30 [110/20] via 2.2.2.1, 00:30:29, GigabitEthernet0/1
     6.0.0.0/30 is subnetted, 1 subnets
O E2    6.6.6.0/30 [110/20] via 2.2.2.1, 00:30:29, GigabitEthernet0/1
O E2 172.16.0.0/16 [110/20] via 2.2.2.1, 00:30:29, GigabitEthernet0/1
O E2 172.17.0.0/16 [110/20] via 2.2.2.1, 00:30:29, GigabitEthernet0/1
O E2 172.18.0.0/16 [110/20] via 2.2.2.1, 00:30:29, GigabitEthernet0/1
     192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.10.0/24 is directly connected, GigabitEthernet0/0
L       192.168.10.1/32 is directly connected, GigabitEthernet0/0
O E2 192.168.20.0/24 [110/20] via 2.2.2.1, 00:48:52, GigabitEthernet0/1
O E2 200.0.0.0/24 [110/20] via 2.2.2.1, 01:50:53, GigabitEthernet0/1
O E2 200.1.1.0/24 [110/20] via 2.2.2.1, 00:30:52, GigabitEthernet0/1
```

- R6

```
R6#show ip route
Codes: L - local, C - connected, S - static, 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

     1.0.0.0/30 is subnetted, 1 subnets
D EX    1.1.1.0/30 [170/5376] via 3.3.3.1, 00:46:31, GigabitEthernet0/0
     2.0.0.0/30 is subnetted, 1 subnets
D EX    2.2.2.0/30 [170/5376] via 3.3.3.1, 00:46:31, GigabitEthernet0/0
     3.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       3.3.3.0/30 is directly connected, GigabitEthernet0/0
L       3.3.3.2/32 is directly connected, GigabitEthernet0/0
     4.0.0.0/30 is subnetted, 1 subnets
D EX    4.4.4.0/30 [170/5376] via 3.3.3.1, 00:28:08, GigabitEthernet0/0
     5.0.0.0/30 is subnetted, 1 subnets
D EX    5.5.5.0/30 [170/5376] via 3.3.3.1, 00:28:08, GigabitEthernet0/0
     6.0.0.0/30 is subnetted, 1 subnets
D EX    6.6.6.0/30 [170/5376] via 3.3.3.1, 00:28:08, GigabitEthernet0/0
D EX 172.16.0.0/16 [170/5376] via 3.3.3.1, 00:28:08, GigabitEthernet0/0
D EX 172.17.0.0/16 [170/5376] via 3.3.3.1, 00:28:08, GigabitEthernet0/0
D EX 172.18.0.0/16 [170/5376] via 3.3.3.1, 00:28:08, GigabitEthernet0/0
D EX 192.168.10.0/24 [170/5376] via 3.3.3.1, 00:46:31, GigabitEthernet0/0
     192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.20.0/24 is directly connected, GigabitEthernet0/1
L       192.168.20.1/32 is directly connected, GigabitEthernet0/1
D EX 200.0.0.0/24 [170/5376] via 3.3.3.1, 01:47:10, GigabitEthernet0/0
D EX 200.1.1.0/24 [170/5376] via 3.3.3.1, 01:28:08, GigabitEthernet0/0
```

- R7

```
R7#show ip route
Codes: L - local, C - connected, S - static, 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

     1.0.0.0/30 is subnetted, 1 subnets
O E2    1.1.1.0/30 [110/1] via 4.4.4.1, 00:29:54, GigabitEthernet0/0
     2.0.0.0/30 is subnetted, 1 subnets
O E2    2.2.2.0/30 [110/1] via 4.4.4.1, 00:29:54, GigabitEthernet0/0
     3.0.0.0/30 is subnetted, 1 subnets
O E2    3.3.3.0/30 [110/1] via 4.4.4.1, 00:29:54, GigabitEthernet0/0
     4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       4.4.4.0/30 is directly connected, GigabitEthernet0/0
L       4.4.4.2/32 is directly connected, GigabitEthernet0/0
     5.0.0.0/30 is subnetted, 1 subnets
O E2    5.5.5.0/30 [110/1] via 4.4.4.1, 00:54:07, GigabitEthernet0/0
     6.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       6.6.6.0/30 is directly connected, Serial0/0/0
L       6.6.6.1/32 is directly connected, Serial0/0/0
     172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.16.0.0/16 is directly connected, GigabitEthernet0/1
L       172.16.0.1/32 is directly connected, GigabitEthernet0/1
O E2 172.17.0.0/16 [110/1] via 4.4.4.1, 00:54:07, GigabitEthernet0/0
R    172.18.0.0/16 [120/1] via 6.6.6.2, 00:00:26, Serial0/0/0
O E2 192.168.10.0/24 [110/1] via 4.4.4.1, 00:29:54, GigabitEthernet0/0
O E2 192.168.20.0/24 [110/1] via 4.4.4.1, 00:29:54, GigabitEthernet0/0
O E2 200.0.0.0/24 [110/1] via 4.4.4.1, 00:29:54, GigabitEthernet0/0
O E2 200.1.1.0/24 [110/1] via 4.4.4.1, 00:54:07, GigabitEthernet0/0
```

- R8

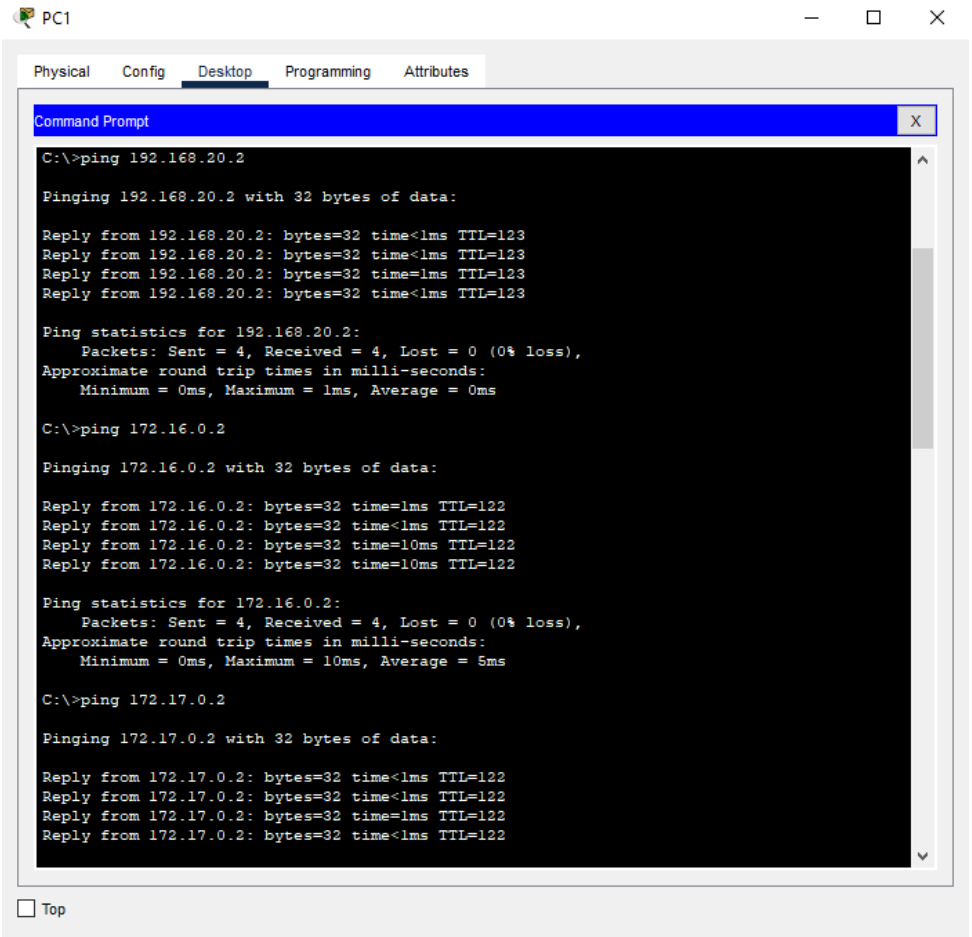
```
R8#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       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

     1.0.0.0/30 is subnetted, 1 subnets
D EX    1.1.1.0/30 [170/5376] via 5.5.5.1, 00:28:49, GigabitEthernet0/0
     2.0.0.0/30 is subnetted, 1 subnets
D EX    2.2.2.0/30 [170/5376] via 5.5.5.1, 00:28:49, GigabitEthernet0/0
     3.0.0.0/30 is subnetted, 1 subnets
D EX    3.3.3.0/30 [170/5376] via 5.5.5.1, 00:28:49, GigabitEthernet0/0
     4.0.0.0/30 is subnetted, 1 subnets
D EX    4.4.4.0/30 [170/3072] via 5.5.5.1, 00:53:53, GigabitEthernet0/0
     5.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       5.5.5.0/30 is directly connected, GigabitEthernet0/0
L       5.5.5.2/32 is directly connected, GigabitEthernet0/0
     6.0.0.0/30 is subnetted, 1 subnets
D EX    6.6.6.0/30 [170/3072] via 5.5.5.1, 00:53:53, GigabitEthernet0/0
D EX 172.16.0.0/16 [170/3072] via 5.5.5.1, 00:53:53, GigabitEthernet0/0
     172.17.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.17.0.0/16 is directly connected, GigabitEthernet0/1
L       172.17.0.1/32 is directly connected, GigabitEthernet0/1
D EX 172.18.0.0/16 [170/3072] via 5.5.5.1, 00:53:53, GigabitEthernet0/0
D EX 192.168.10.0/24 [170/5376] via 5.5.5.1, 00:28:49, GigabitEthernet0/0
D EX 192.168.20.0/24 [170/5376] via 5.5.5.1, 00:28:49, GigabitEthernet0/0
D EX 200.0.0.0/24 [170/5376] via 5.5.5.1, 00:28:49, GigabitEthernet0/0
D EX 200.1.1.0/24 [170/5376] via 5.5.5.1, 01:39:10, GigabitEthernet0/0
```

- R9

```
R9#show ip route
Codes: L - local, C - connected, S - static, 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

R    1.0.0.0/8 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
R    2.0.0.0/8 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
R    3.0.0.0/8 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
R    4.0.0.0/8 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
R    5.0.0.0/8 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
     6.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       6.6.6.0/30 is directly connected, Serial0/0/0
L       6.6.6.2/32 is directly connected, Serial0/0/0
R    172.16.0.0/16 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
R    172.17.0.0/16 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
     172.18.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.18.0.0/16 is directly connected, GigabitEthernet0/0
L       172.18.0.1/32 is directly connected, GigabitEthernet0/0
R    192.168.10.0/24 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
R    192.168.20.0/24 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
R    200.0.0.0/24 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
R    200.1.1.0/24 [120/1] via 6.6.6.1, 00:00:12, Serial0/0/0
```

b. Test Ping

- PC1 → PC2, PC3, PC4, dan PC5



```
Ping statistics for 172.17.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 172.18.0.2

Pinging 172.18.0.2 with 32 bytes of data:

Reply from 192.168.10.1: Destination host unreachable.
Request timed out.
Reply from 192.168.10.1: Destination host unreachable.
Reply from 192.168.10.1: Destination host unreachable.

Ping statistics for 172.18.0.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

- PC2 → PC1, PC3, PC4, dan PC5

PC2

Physical Config Desktop Programming Attributes

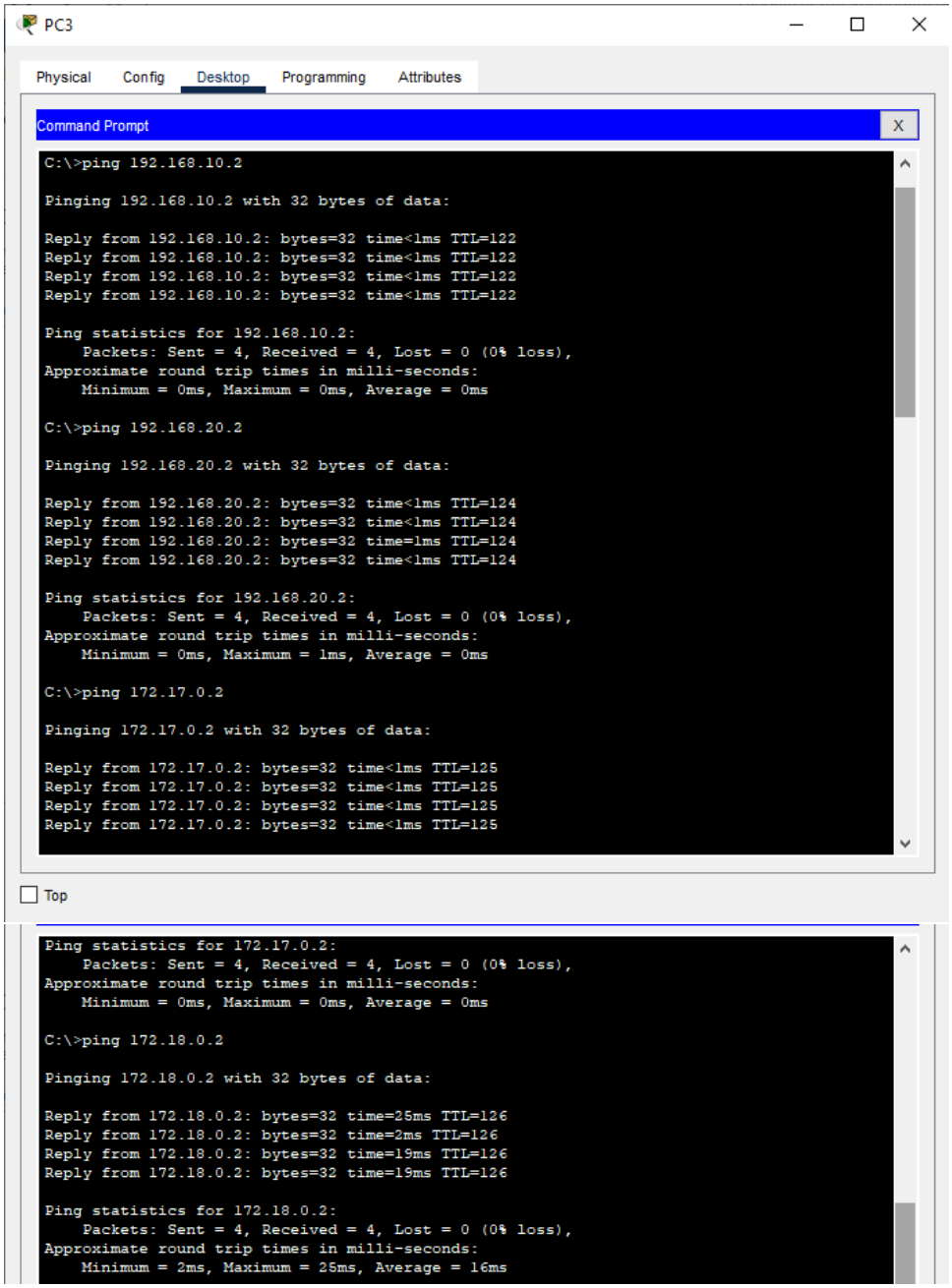
Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time<1ms TTL=123
Reply from 192.168.10.2: bytes=32 time<1ms TTL=123
Reply from 192.168.10.2: bytes=32 time<1ms TTL=123
Reply from 192.168.10.2: bytes=32 time<1ms TTL=123

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 172.16.0.2

Pinging 172.16.0.2 with 32 bytes of data:

Reply from 172.16.0.2: bytes=32 time<1ms TTL=124
Reply from 172.16.0.2: bytes=32 time<1ms TTL=124
Reply from 172.16.0.2: bytes=32 time<1ms TTL=124
Reply from 172.16.0.2: bytes=32 time<1ms TTL=124

Ping statistics for 172.16.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 172.17.0.2

Pinging 172.17.0.2 with 32 bytes of data:

Reply from 172.17.0.2: bytes=32 time<1ms TTL=124
Reply from 172.17.0.2: bytes=32 time<1ms TTL=124
Reply from 172.17.0.2: bytes=32 time<1ms TTL=124
Reply from 172.17.0.2: bytes=32 time<1ms TTL=124
```

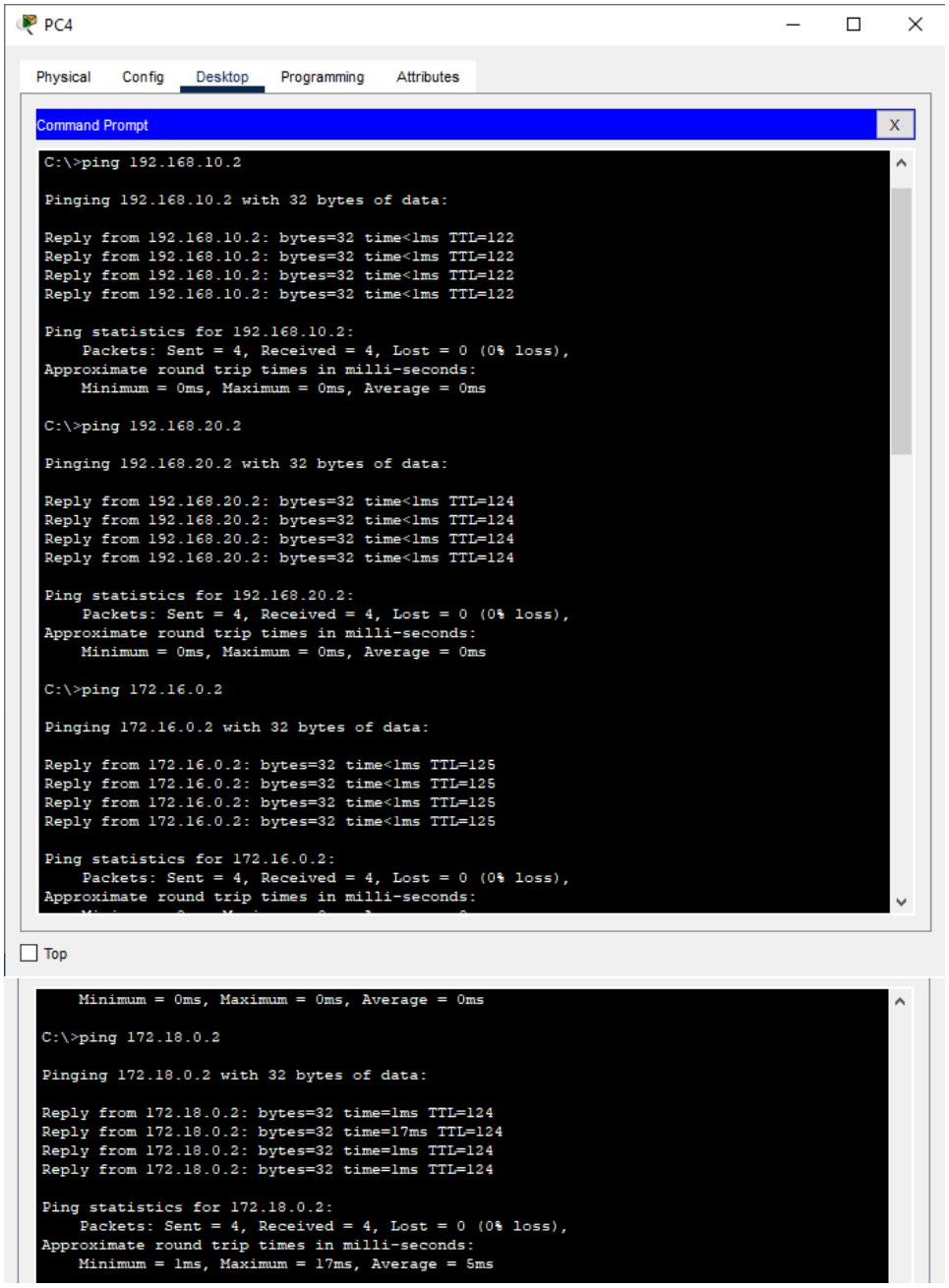
Top

```
Ping statistics for 172.17.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 172.18.0.2
```

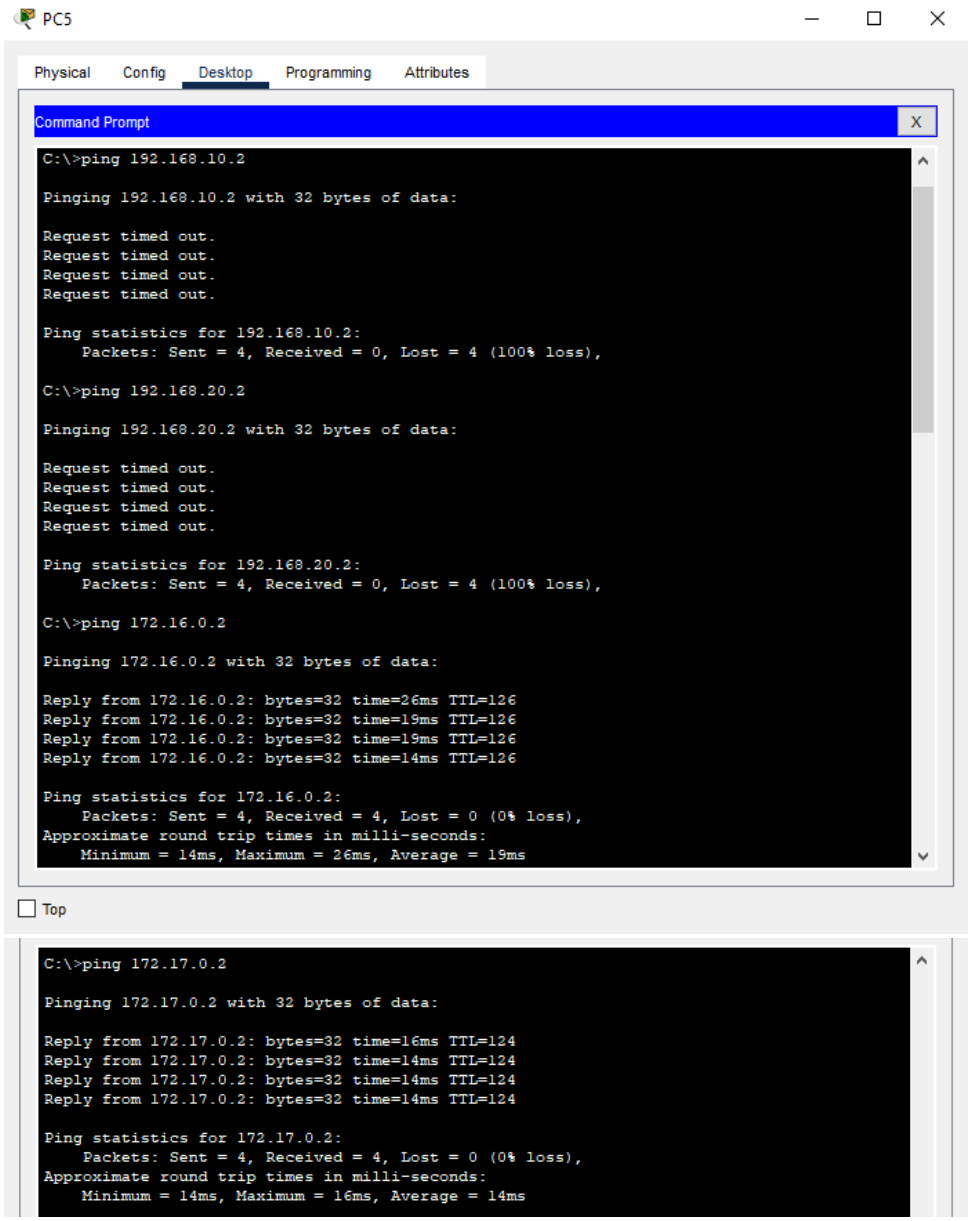
- PC3 → PC1, PC2, PC4, dan PC5



- PC4 → PC1, PC2, PC3, dan PC5

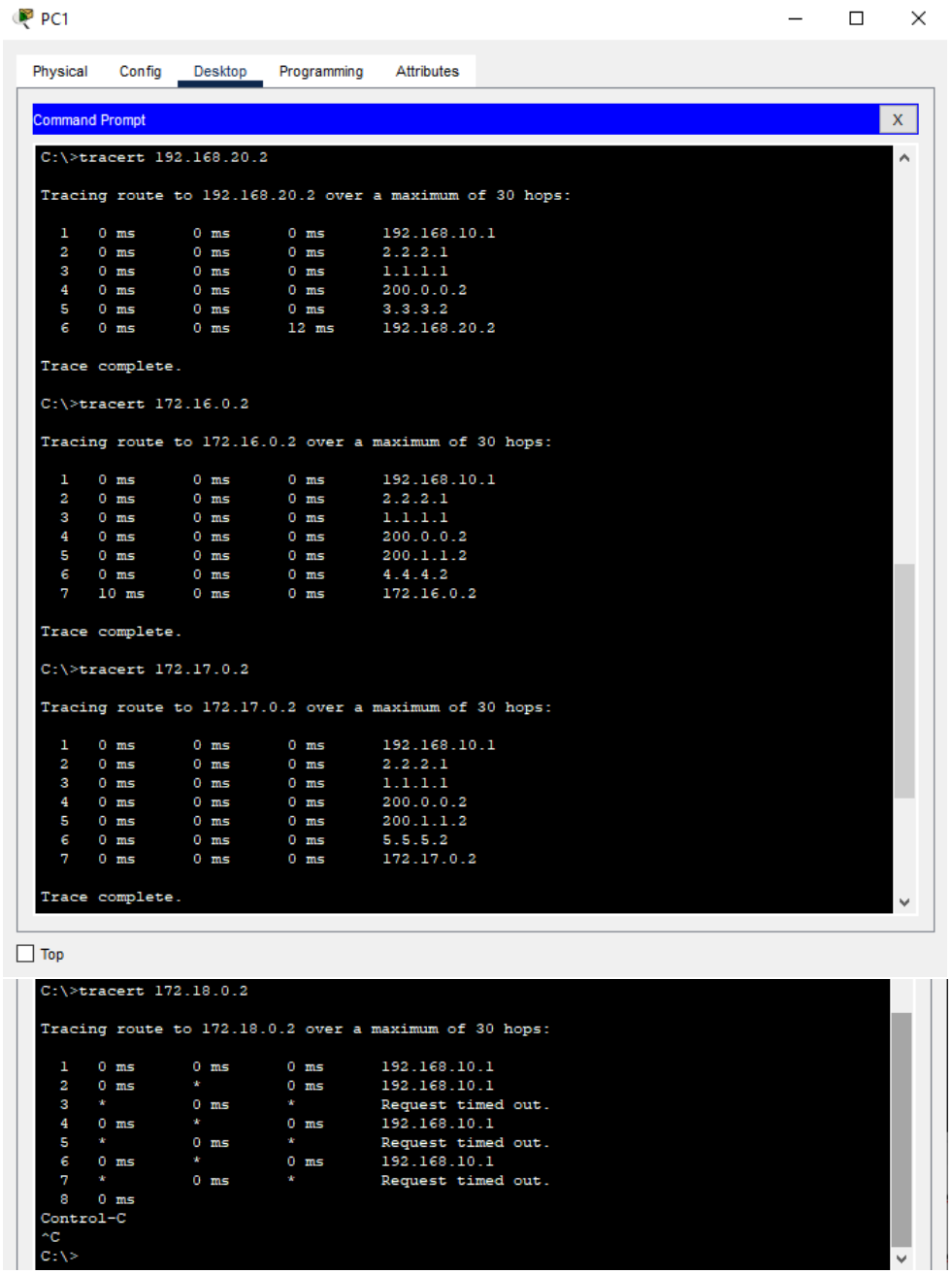


- PC5 → PC1, PC2, PC3, dan PC4

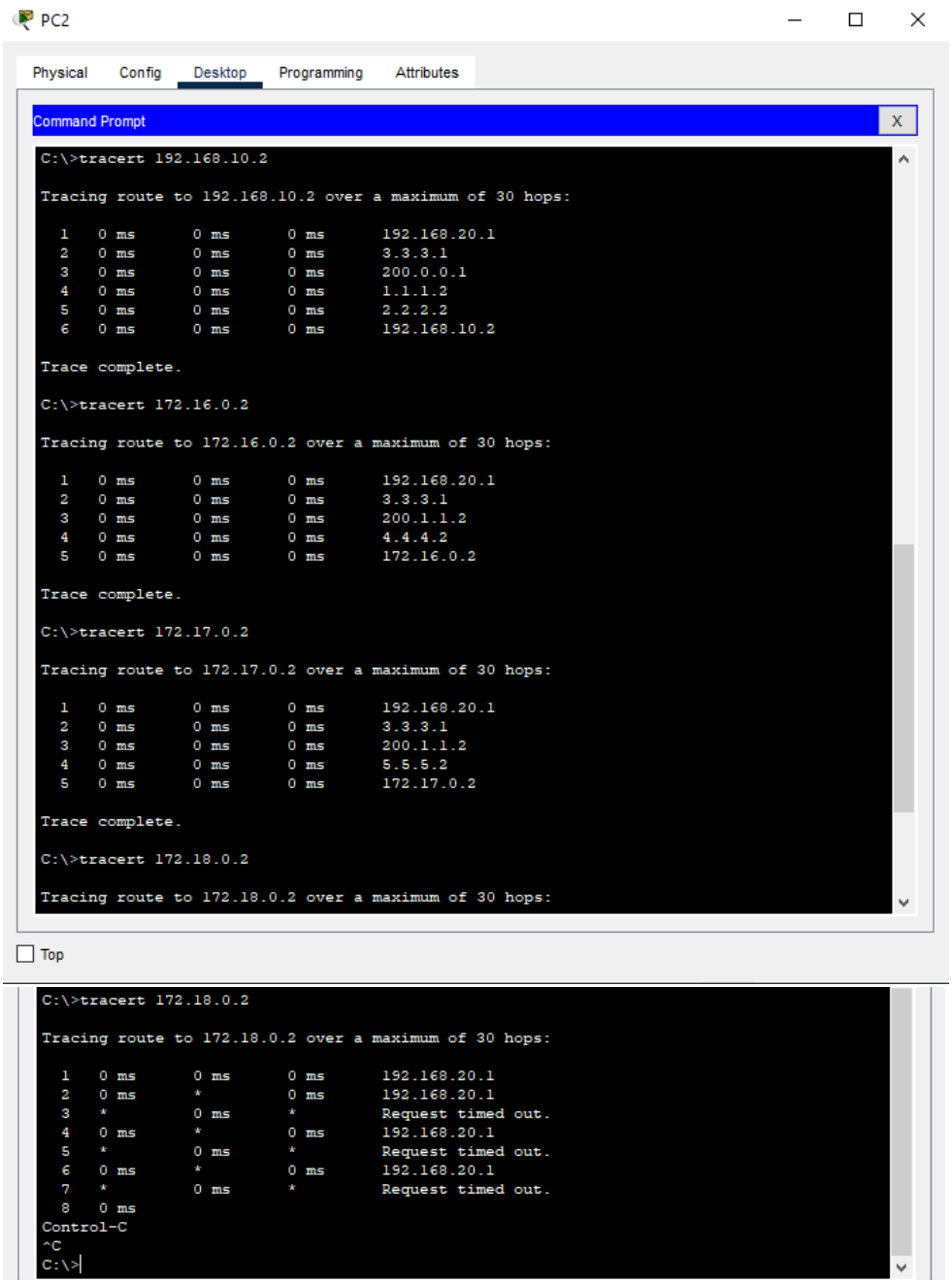


c. Test Tracert

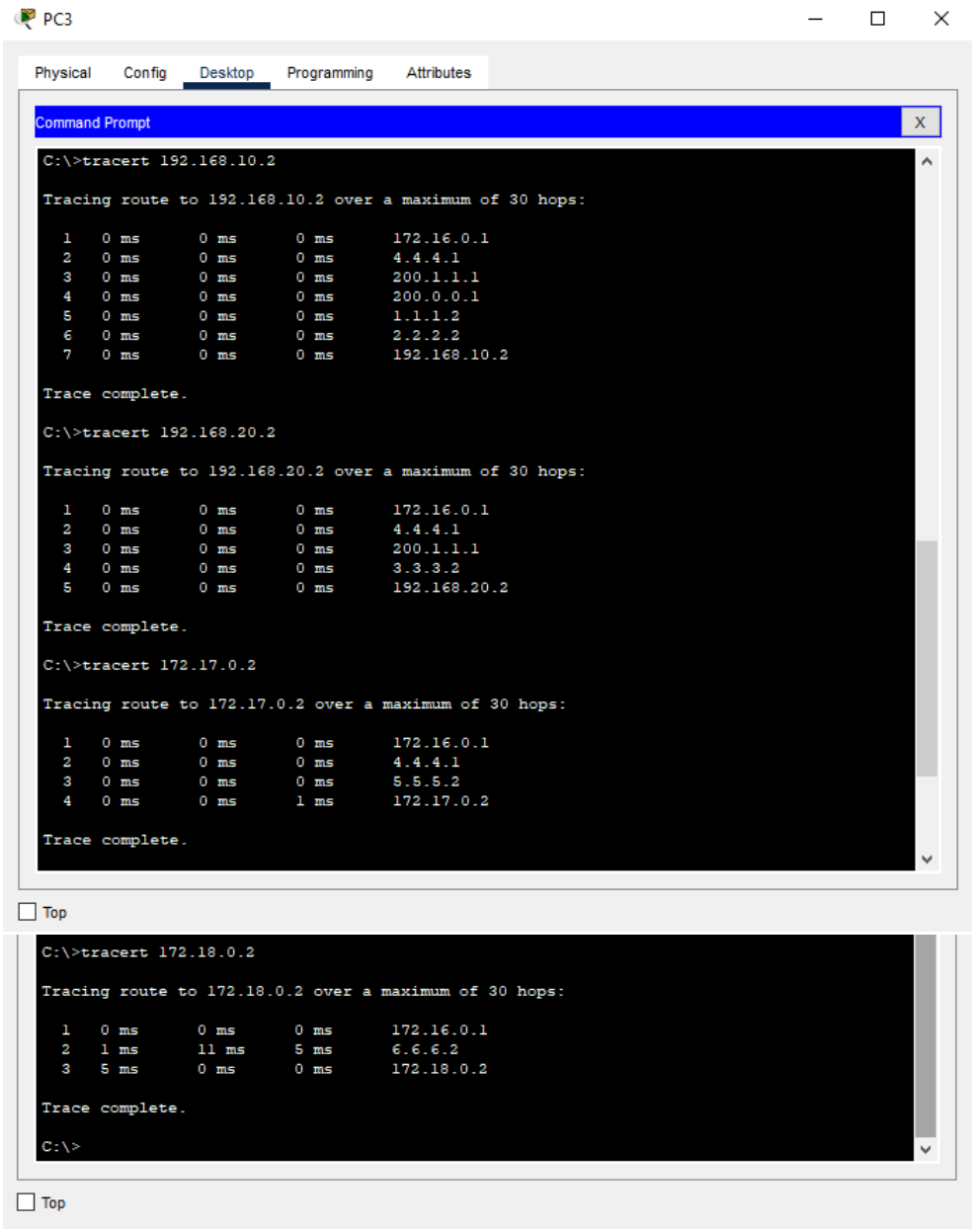
- PC1→ PC2, PC3, PC4, dan PC5



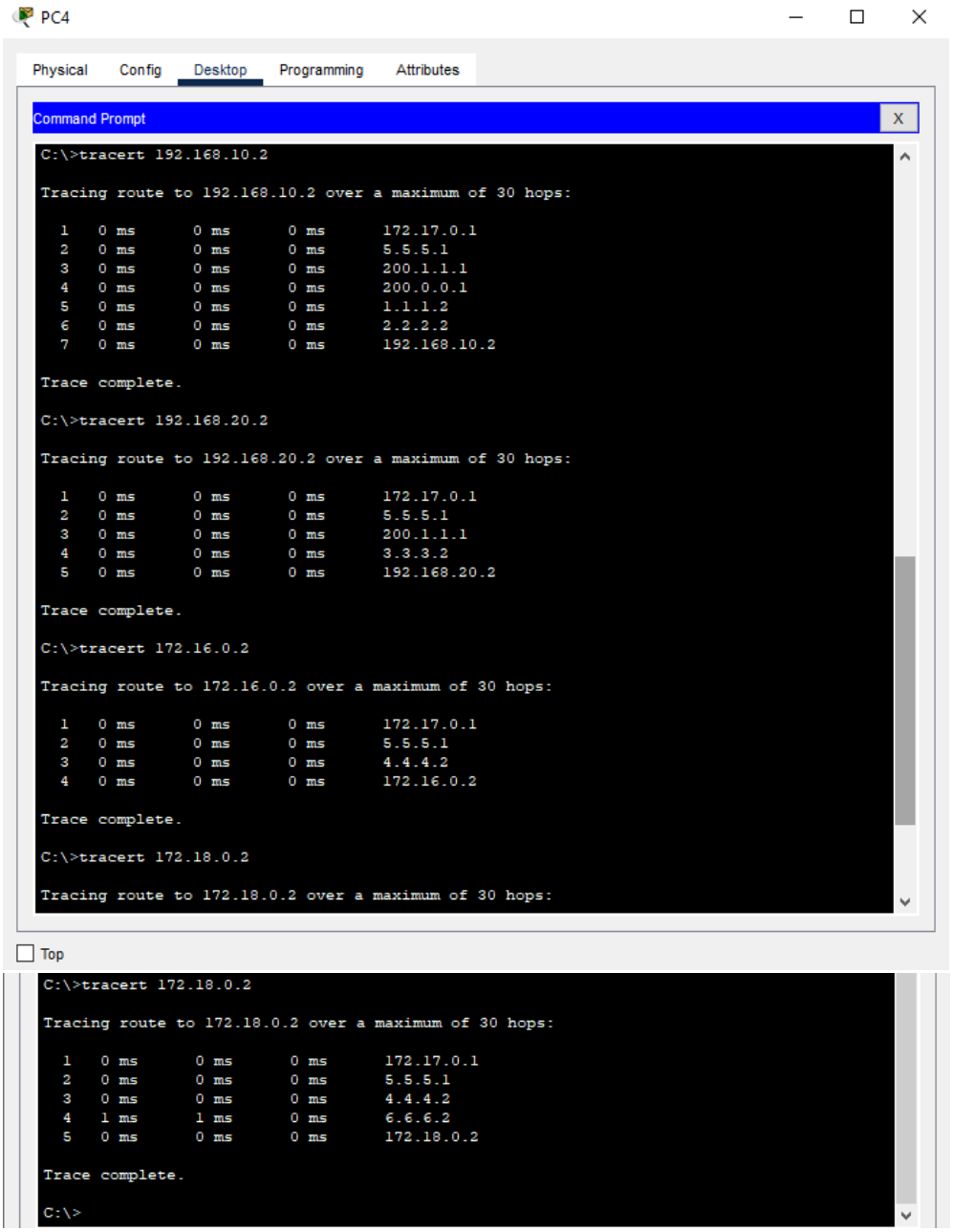
- PC2→ PC1, PC3, PC4, dan PC5



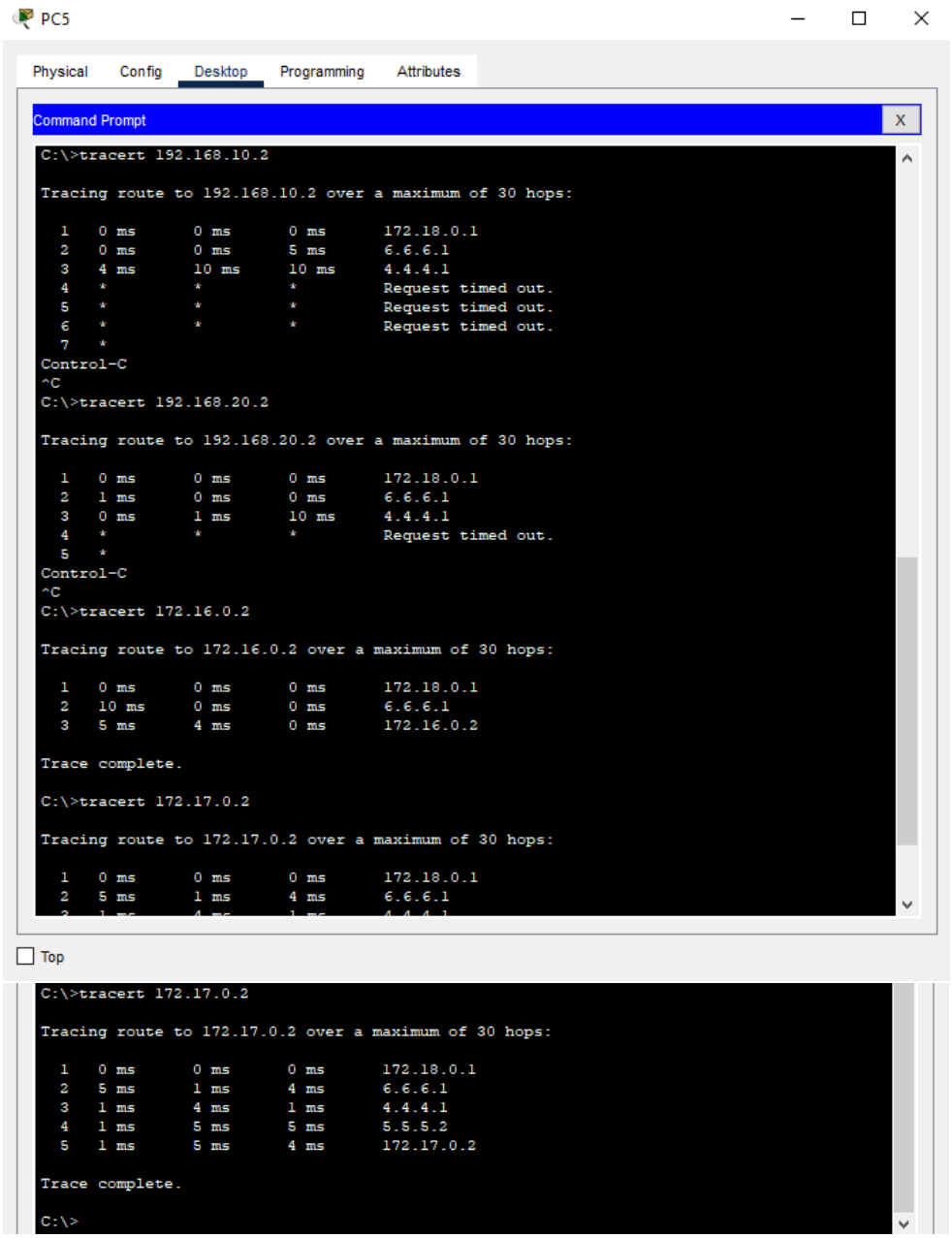
- PC3→ PC1, PC2, PC4, dan PC5



- PC4→ PC1, PC2, PC3, dan PC5



- PC5→ PC1, PC2, PC3, dan PC4



5. ANALISA

Pada percobaan kali ini dilakukan konfigurasi BGP atau Border Gateway Protocol. Konfigurasi pada praktikum kali ini menggunakan tiga jenis intradomain yakni rip versi 2 ospf dan eigrp. Hal ini akan digabung menggunakan area inter domain yakni BGP. Pada praktikum kali ini terdapat 9 router yang digunakan dan 5 PC. Sebelum merangkai pada Cisco packet Tracer kita akan merancang terlebih dahulu pada selembar kertas yang mana pada praktikum kali ini terdapat 3 area AS yakni AS-1 = 100, AS-2 = 101, dan AS-3 = 102. Pada area AS1 terdapat area OSPF dan BGP. Sedangkan Area AS2 terdapat area EIGRP dan BGP. Sedangkan area AS3 terdapat area RIPv2 dan OSPF ditambah area EIGRP.

Hal yang perlu diperhatikan pada praktikum kali ini yaitu melakukan konfigurasi pada setiap router mulai dari pengalamatan setiap sambungan sampai dengan konfigurasi router sesuai dengan daerah-daerah yang telah ditentukan atau telah direncanakan.

Setelah dilakukan pengalamatan pada setiap sambungan dari router router maka dilakukan pengecekan menggunakan command ping pada setiap sambungan di router tersebut. Kemudian dilakukan konfigurasi tabel routing pada setiap routernya pada R1 dilakukan konfigurasi router bgb dengan as 100 dan router OSPF. Pada melakukan konfigurasi router router ini dilakukan agar bisa terkoneksi antara BGP dengan ospf menggunakan command "redistribute" pada setiap konfigur areanya. Sehingga pada R1 dilakukan konfigurasi redistribute ospf 1 dan redistribute bgp 100 subnets. Subnet di sini agar Ospf pada BGP agar dikenali sebagai IP classless

Hasil dari percobaan yang telah dilakukan dapat diketahui PC 1 dapat memberikan paket pesan icmp ke PC 2 PC 3 PC4. Sedangkan pada PC 5 tidak bisa atau destination host unreacable. Begitu juga pada PC 2 tidak dapat atau tidak berhasil melakukan pengiriman paket ICMP ke PC 5. Apabila PC3 dapat melakukan pengiriman paket ICMP ke semua PC. Begitu juga pada PC 4. Berbeda lagi dengan PC 5 yang hanya bisa melakukan pengiriman paket icmp ke PC3. Sedangkan pengiriman pada PC yang lainnya terjadi kegagalan atau request time out. Kegagalan-kegagalan pengiriman paket ICMP ini terjadi karena pada daerah PC 5 merupakan intradomain yang link state. Sehingga pc5 hanya bisa melakukan pengiriman pada pc3. Begitu juga pada pd4 atau pc3 dapat melakukan pengiriman paket idmp pada pc5 karena pada daerah as3 merupakan daerah intradomen baik secara link state maupun distance vector. Apabila telah berbeda as maka tidak bisa karena perbedaan as di sini telah melewati batas dari Inter domain sehingga pc1 dan pc2 tidak bisa melakukan pengiriman pada PC 5.

Apabila dilihat dari hasil percobaan mengenai tabel routing setiap router dapat diketahui pada R1 mendapatkan alamat pada daerah bgb dan juga Ospf. Sedangkan pada R2 mendapatkan alamat area OSPF dan EIGRP di sisi as 101. Pada R3 mendapatkan alamat BGP, EIGRP dan OSPF E2. E2 di sini menyatakan bahwa area os dengan eksternal area yakni melewati batas as lokal.

6. KESIMPULAN

Dapat disimpulkan bahwa ketika PC pada daerah Inter domain tidak bisa mengakses PC pada daerah intradomen dengan link state sedangkan PC pada daerah intradomen dapat mengakses PC daerah Inter domain. Hal yang perlu diperhatikan pada praktikum kali ini yaitu melakukan konfigurasi pada setiap router mulai dari pengalamatan setiap sambungan sampai dengan konfigurasi router sesuai dengan daerah-daerah yang telah ditentukan atau telah direncanakan.