

Laporan Praktikum

Desain dan Manajemen Jaringan
Komputer

TUGAS 5
Akademik ITK



Disusun Oleh :

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Kriteria Penilaian

- **Implementasi Routing Dinamis (40%):**
 - Konfigurasi protokol routing (RIP atau OSPF) yang benar pada setiap router.
 - Routing table diperbarui secara otomatis sehingga semua jaringan tercapai.
- **Verifikasi & Konektivitas End-to-End (40%):**
 - Pengujian ping dan traceroute yang berhasil antar subnet.
 - Penampilan routing table yang memuat entry dari protokol routing dinamis.
- **Dokumentasi & Pemahaman Konsep (20%):**
 - Laporan mencakup diagram/topologi jaringan, tabel konfigurasi IP dan routing, serta screenshot konfigurasi CLI dan hasil uji konektivitas.
 - Penjelasan konsep dasar routing dinamis, perbedaan antara RIP dan OSPF (jika didiskusikan), dan mekanisme update routing secara otomatis.

Jawaban

1. Menentukan Topologi dan Alamat IP

Contoh Topologi

Buatlah topologi yang terdiri dari 3 router yang saling terhubung untuk mengimplementasikan routing dinamis. Setiap router menghubungkan 1 atau 2 subnet.

- Router A:

- Terhubung ke Subnet 10.0.1.0/24 (interface ke jaringan lokal).
- Terhubung ke Router B melalui link point-to-point (misalnya 192.168.12.0/30).

- Router B:

- Terhubung ke Router A (link 192.168.12.0/30).
- Terhubung ke Router C melalui link point-to-point (misalnya 192.168.23.0/30).
- Terhubung ke Subnet 10.0.2.0/24 (jaringan lokal).

- Router C:

- Terhubung ke Router B (link 192.168.23.0/30).
- Terhubung ke Subnet 10.0.3.0/24 (jaringan lokal).

Alokasi IP (Contoh)

- Link A-B:

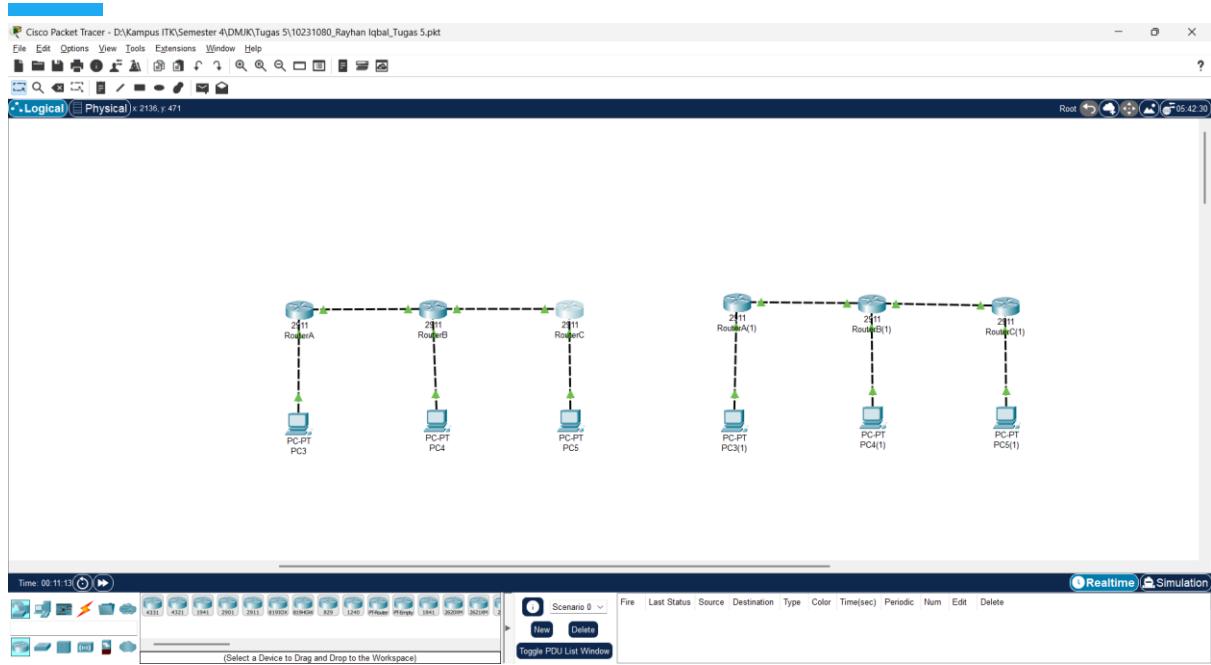
- Gunakan subnet /30 (mask 255.255.255.252).
- IP untuk Router A: 192.168.12.1
- IP untuk Router B: 192.168.12.2

- Link B-C:

- Gunakan subnet /30.
- IP untuk Router B: 192.168.23.1
- IP untuk Router C: 192.168.23.2

- Subnet Lokal:

- Router A, Subnet 10.0.1.0/24, IP interface: 10.0.1.1
- Router B, Subnet 10.0.2.0/24, IP interface: 10.0.2.1
- Router C, Subnet 10.0.3.0/24, IP interface: 10.0.3.1



Kiri RIP dan Kanan OSPF

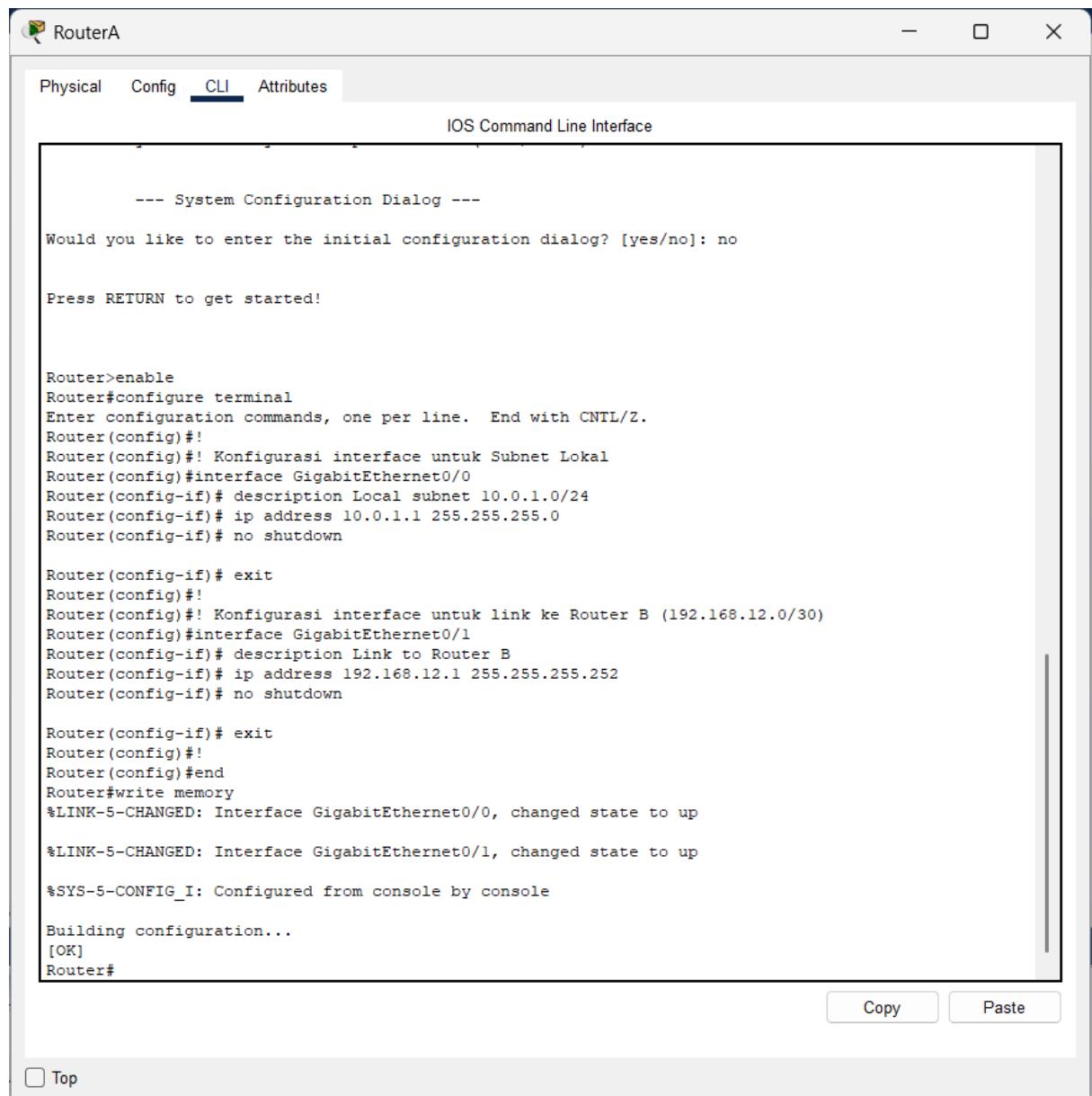
2. Konfigurasi Fisik di Router

a) Pilih Router dan Periksa Interface

Gunakan tiga router (misalnya Cisco 2911) dan pastikan masing-masing router memiliki interface yang diperlukan. Gunakan interface GigabitEthernet untuk link point-to-point dan interface lainnya untuk subnet lokal.

b) Konfigurasi Interface pada Setiap Router

Contoh konfigurasi pada Router A:



```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#! Konfigurasi interface untuk Subnet Lokal
Router(config)#interface GigabitEthernet0/0
Router(config-if)# description Local subnet 10.0.1.0/24
Router(config-if)# ip address 10.0.1.1 255.255.255.0
Router(config-if)# no shutdown

Router(config-if)# exit
Router(config)#
Router(config)#! Konfigurasi interface untuk link ke Router B (192.168.12.0/30)
Router(config)#interface GigabitEthernet0/1
Router(config-if)# description Link to Router B
Router(config-if)# ip address 192.168.12.1 255.255.255.252
Router(config-if)# no shutdown

Router(config-if)# exit
Router(config)#
Router#end
Router#write memory
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%SYS-5-CONFIG_I: Configured from console by console

Building configuration...
[OK]
Router#
```

Copy Paste

Top

Contoh konfigurasi pada Router B:

The screenshot shows a Windows-style application window titled "RouterB". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the following configuration commands:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#! Interface menghubungkan ke Router A (192.168.12.0/30)
Router(config)#interface GigabitEthernet0/0
Router(config-if)# description Link to Router A
Router(config-if)# ip address 192.168.12.2 255.255.255.252
Router(config-if)# no shutdown

Router(config-if)# exit
Router(config)#! Interface untuk Subnet Lokal
Router(config)#interface GigabitEthernet0/1
Router(config-if)# description Local subnet 10.0.2.0/24
Router(config-if)# ip address 10.0.2.1 255.255.255.0
Router(config-if)# no shutdown

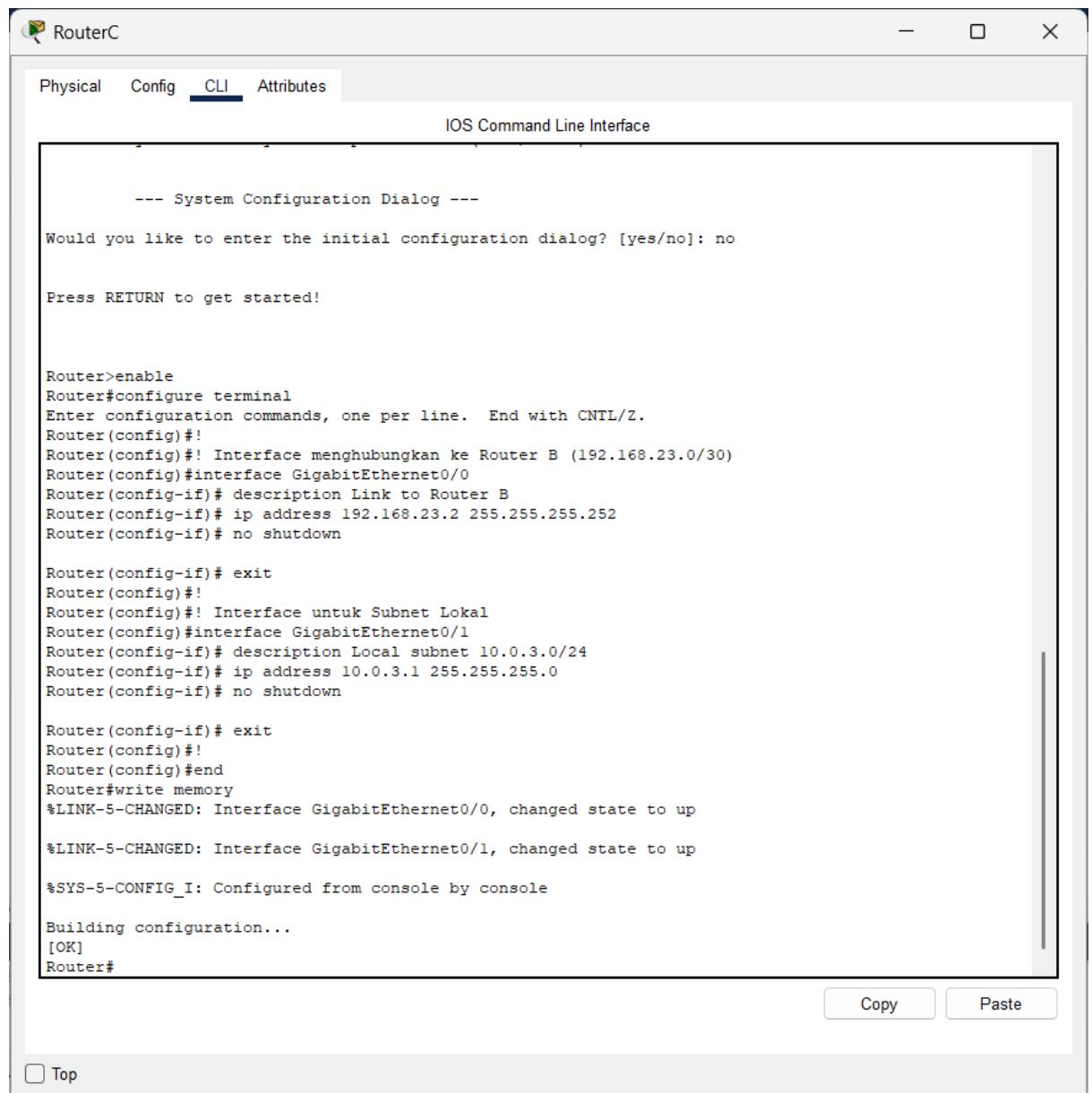
Router(config-if)# exit
Router(config)#! Interface untuk link ke Router C (192.168.23.0/30)
Router(config)#interface GigabitEthernet0/2
Router(config-if)# description Link to Router C
Router(config-if)# ip address 192.168.23.1 255.255.255.252
Router(config-if)# no shutdown

Router(config-if)# exit
Router(config)#! end
Router#write memory
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up
%SYS-5-CONFIG_I: Configured from console by console

Building configuration...
[OK]
Router#
```

At the bottom right of the CLI window are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".

Contoh konfigurasi pada Router C:



The screenshot shows a Windows Command Line Interface window titled "RouterC". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is the title "IOS Command Line Interface". The main area displays the following configuration commands:

```
--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: no
Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#! Interface menghubungkan ke Router B (192.168.23.0/30)
Router(config)#interface GigabitEthernet0/0
Router(config-if)# description Link to Router B
Router(config-if)# ip address 192.168.23.2 255.255.255.252
Router(config-if)# no shutdown

Router(config-if)# exit
Router(config)#! Interface untuk Subnet Lokal
Router(config)#interface GigabitEthernet0/1
Router(config-if)# description Local subnet 10.0.3.0/24
Router(config-if)# ip address 10.0.3.1 255.255.255.0
Router(config-if)# no shutdown

Router(config-if)# exit
Router(config)#! end
Router#write memory
*LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
*LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
*SYS-5-CONFIG_I: Configured from console by console

Building configuration...
[OK]
Router#
```

At the bottom right of the window are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".

3. Konfigurasi Dynamic Routing

Pilih Protokol:

Mahasiswa dapat memilih untuk menggunakan RIP atau OSPF. Pada contoh ini, akan ditunjukkan konfigurasi RIP karena konfigurasinya lebih sederhana dan mudah diverifikasi.

a) Konfigurasi RIP pada Masing-Masing Router

Router A (RIP):

```
Router(config-if)# description Local subnet 10.0.1.0/24
Router(config-if)# ip address 10.0.1.1 255.255.255.0
Router(config-if)# no shutdown

Router(config-if)# exit
Router(config)#
Router(config)#! Konfigurasi interface untuk link ke Router B (192.168.12.0/30)
Router(config)#interface GigabitEthernet0/1
Router(config-if)# description Link to Router B
Router(config-if)# ip address 192.168.12.1 255.255.255.252
Router(config-if)# no shutdown

Router(config-if)# exit
Router(config)#
Router(config)#end
Router#write memory
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%SYS-5-CONFIG_I: Configured from console by console

Building configuration...
[OK]
Router#
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#router rip
Router(config-router)# version 2
Router(config-router)# network 10.0.1.0
Router(config-router)# network 192.168.12.0
Router(config-router)# exit
Router(config)#
Router(config)#end
Router#write memory
%SYS-5-CONFIG_I: Configured from console by console

Building configuration...
[OK]
Router#
```

Top

Router B (RIP):

The screenshot shows a Windows-style application window titled "RouterB". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the following configuration commands:

```
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)#
Router(config)#end
Router#write memory
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up
%SYS-5-CONFIG_I: Configured from console by console

Building configuration...
[OK]
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#router rip
Router(config-router)# version 2
Router(config-router)# network 10.0.2.0
Router(config-router)# network 192.168.12.0
Router(config-router)# network 192.168.23.0
Router(config-router)# exit
Router(config)#
Router(config)#end
Router#write memory
%SYS-5-CONFIG_I: Configured from console by console

Building configuration...
[OK]
Router#
```

At the bottom right of the window are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".

Router C (RIP):

The screenshot shows a Windows-style application window titled "RouterC". The window has a tab bar at the top with "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains the following configuration commands:

```
Router(config-if)# exit
Router(config)#! Interface untuk Subnet Lokal
Router(config)#interface GigabitEthernet0/1
Router(config)#description Local subnet 10.0.3.0/24
Router(config-if)# ip address 10.0.3.1 255.255.255.0
Router(config-if)# no shutdown

Router(config-if)# exit
Router(config)#! end
Router#write memory
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%SYS-5-CONFIG_I: Configured from console by console

Building configuration...
[OK]
Router#
Router#
Router#
Router#
Router#
Router#enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#! rip
Router(config-router)# version 2
Router(config-router)# network 10.0.3.0
Router(config-router)# network 192.168.23.0
Router(config-router)# exit
Router(config)#! end
Router#write memory
%SYS-5-CONFIG_I: Configured from console by console

Building configuration...
[OK]
Router#
```

At the bottom right of the window are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".

b) Konfigurasi OSPF pada Masing-Masing Router

Router A (OSPF):

Router B (OSPF):

Router C (OSPF):

Catatan:

- Pastikan RIP versi 2 digunakan agar mendukung VLSM dan update routing yang lebih cepat.
 - Jika menggunakan OSPF, konfigurasi akan melibatkan penentuan area (misal, area 0) dan perintah seperti router ospf 1 diikuti dengan perintah network sesuai dengan wildcard mask. Contoh:

```
router ospf 1  
network 10.0.1.0 0.0.0.255 area 0  
network 192.168.12.0 0.0.0.3 area 0
```

atau

```
enable  
configure terminal  
!  
router ospf 1
```

```

network 10.0.1.0 0.0.0.255 area 0
network 192.168.12.0 0.0.0.3 area 0
exit
!
end
write memory

```

4. Verifikasi dan Pengujian Routing

a) Verifikasi Routing Table (**RIP**)

Pada masing-masing router, verifikasi routing table menggunakan perintah:

Router A (RIP):

```

RouterA
Physical Config CLI Attributes
IOS Command Line Interface
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wzl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Router>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

      10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
R        10.0.0.0/8 [120/1] via 192.168.12.2, 00:00:19, GigabitEthernet0/1
C        10.0.1.0/24 is directly connected, GigabitEthernet0/0
L        10.0.1.1/32 is directly connected, GigabitEthernet0/0
      192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.12.0/30 is directly connected, GigabitEthernet0/1
L        192.168.12.1/32 is directly connected, GigabitEthernet0/1
R        192.168.23.0/24 [120/1] via 192.168.12.2, 00:00:19, GigabitEthernet0/1

Router>

```

Top

Router B (RIP):

The screenshot shows a Windows application window titled "RouterB". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area displays the following text:

```
Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.  
Processor board ID FTX152400KS  
3 Gigabit Ethernet interfaces  
DRAM configuration is 64 bits wide with parity disabled.  
255K bytes of non-volatile configuration memory.  
249856K bytes of ATA System CompactFlash 0 (Read/Write)  
  
Press RETURN to get started!  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up  
  
Router>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  
  
      10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks  
R        10.0.0.0/8 [120/1] via 192.168.12.1, 00:00:25, GigabitEthernet0/0  
                  [120/1] via 192.168.23.2, 00:00:02, GigabitEthernet0/2  
C        10.0.2.0/24 is directly connected, GigabitEthernet0/1  
L        10.0.2.1/32 is directly connected, GigabitEthernet0/1  
      192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks  
C        192.168.12.0/30 is directly connected, GigabitEthernet0/0  
L        192.168.12.2/32 is directly connected, GigabitEthernet0/0  
      192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks  
C        192.168.23.0/30 is directly connected, GigabitEthernet0/2  
L        192.168.23.1/32 is directly connected, GigabitEthernet0/2  
  
Router>
```

At the bottom right of the window are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".

Router C (RIP):

The screenshot shows a Windows application window titled "RouterC". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs is a section titled "IOS Command Line Interface". The main area displays the following text:

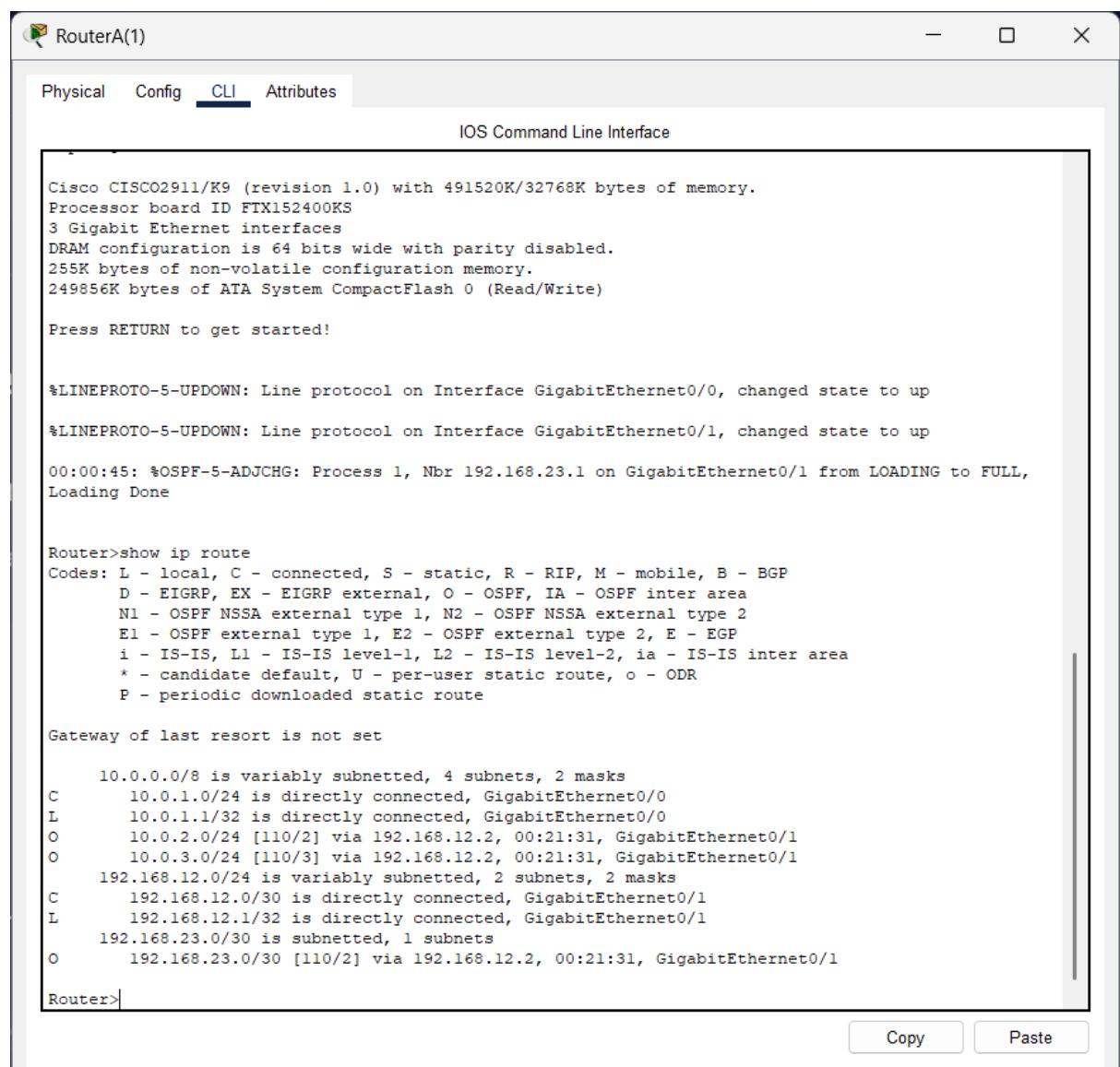
```
A summary of U.S. laws governing Cisco cryptographic products may be found at:  
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html  
  
If you require further assistance please contact us by sending email to  
export@cisco.com.  
  
Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.  
Processor board ID FTX152400KS  
3 Gigabit Ethernet interfaces  
DRAM configuration is 64 bits wide with parity disabled.  
255K bytes of non-volatile configuration memory.  
249856K bytes of ATA System CompactFlash 0 (Read/Write)  
  
Press RETURN to get started!  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up  
  
Router>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  
  
      10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks  
R        10.0.0.0/8 [120/1] via 192.168.23.1, 00:00:18, GigabitEthernet0/0  
C        10.0.3.0/24 is directly connected, GigabitEthernet0/1  
L        10.0.3.1/32 is directly connected, GigabitEthernet0/1  
R        192.168.12.0/24 [120/1] via 192.168.23.1, 00:00:18, GigabitEthernet0/0  
          192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks  
C          192.168.23.0/30 is directly connected, GigabitEthernet0/0  
L          192.168.23.2/32 is directly connected, GigabitEthernet0/0  
  
Router>
```

At the bottom right of the window are "Copy" and "Paste" buttons. At the bottom left is a checkbox labeled "Top".

Verifikasi Routing Table (**OSPF**)

Pada masing-masing router, verifikasi routing table menggunakan perintah:

Router A (OSPF):



```
Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
00:00:45: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.23.1 on GigabitEthernet0/1 from LOADING to FULL,
Loading Done

Router>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

      10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C        10.0.1.0/24 is directly connected, GigabitEthernet0/0
L        10.0.1.1/32 is directly connected, GigabitEthernet0/0
O        10.0.2.0/24 [110/2] via 192.168.12.2, 00:21:31, GigabitEthernet0/1
O        10.0.3.0/24 [110/3] via 192.168.12.2, 00:21:31, GigabitEthernet0/1
          192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C          192.168.12.0/30 is directly connected, GigabitEthernet0/1
L          192.168.12.1/32 is directly connected, GigabitEthernet0/1
          192.168.23.0/30 is subnetted, 1 subnets
O          192.168.23.0/30 [110/2] via 192.168.12.2, 00:21:31, GigabitEthernet0/1

Router>
```

Copy Paste

Router B (OSPF):

RouterB(1)

Physical Config **CLI** Attributes

IOS Command Line Interface

```
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up
00:00:40: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.23.2 on GigabitEthernet0/2 from LOADING to FULL,
Loading Done
00:00:45: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.12.1 on GigabitEthernet0/0 from LOADING to FULL,
Loading Done

Router>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

      10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
O        10.0.1.0/24 [110/2] via 192.168.12.1, 00:24:46, GigabitEthernet0/0
C        10.0.2.0/24 is directly connected, GigabitEthernet0/1
L        10.0.2.1/32 is directly connected, GigabitEthernet0/1
O        10.0.3.0/24 [110/2] via 192.168.23.2, 00:24:46, GigabitEthernet0/2
      192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.12.0/30 is directly connected, GigabitEthernet0/0
L        192.168.12.2/32 is directly connected, GigabitEthernet0/0
      192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.23.0/30 is directly connected, GigabitEthernet0/2
L        192.168.23.1/32 is directly connected, GigabitEthernet0/2

Router>
```

Top

Router C (OSPF):

The screenshot shows the CLI interface for Router C (OSPF). The window title is "RouterC(1)". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is titled "IOS Command Line Interface". The output of the "show ip route" command is displayed:

```
Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.  
Processor board ID FTX152400KS  
3 Gigabit Ethernet interfaces  
DRAM configuration is 64 bits wide with parity disabled.  
255K bytes of non-volatile configuration memory.  
249856K bytes of ATA System CompactFlash 0 (Read/Write)  
  
Press RETURN to get started!  
  
*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up  
*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up  
00:00:40: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.23.1 on GigabitEthernet0/0 from LOADING to FULL,  
Loading Done  
  
Router>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  
  
      10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks  
O        10.0.1.0/24 [110/3] via 192.168.23.1, 00:25:30, GigabitEthernet0/0  
O        10.0.2.0/24 [110/2] via 192.168.23.1, 00:25:40, GigabitEthernet0/0  
C        10.0.3.0/24 is directly connected, GigabitEthernet0/1  
L        10.0.3.1/32 is directly connected, GigabitEthernet0/1  
          192.168.12.0/30 is subnetted, 1 subnets  
O          192.168.12.0/30 [110/2] via 192.168.23.1, 00:25:40, GigabitEthernet0/0  
          192.168.23.0/24 is variably subnetted, 2 subnets, 2 masks  
C          192.168.23.0/30 is directly connected, GigabitEthernet0/0  
L          192.168.23.2/32 is directly connected, GigabitEthernet0/0  
  
Router>
```

At the bottom right of the CLI window, there are "Copy" and "Paste" buttons. At the bottom left, there is a "Top" button.

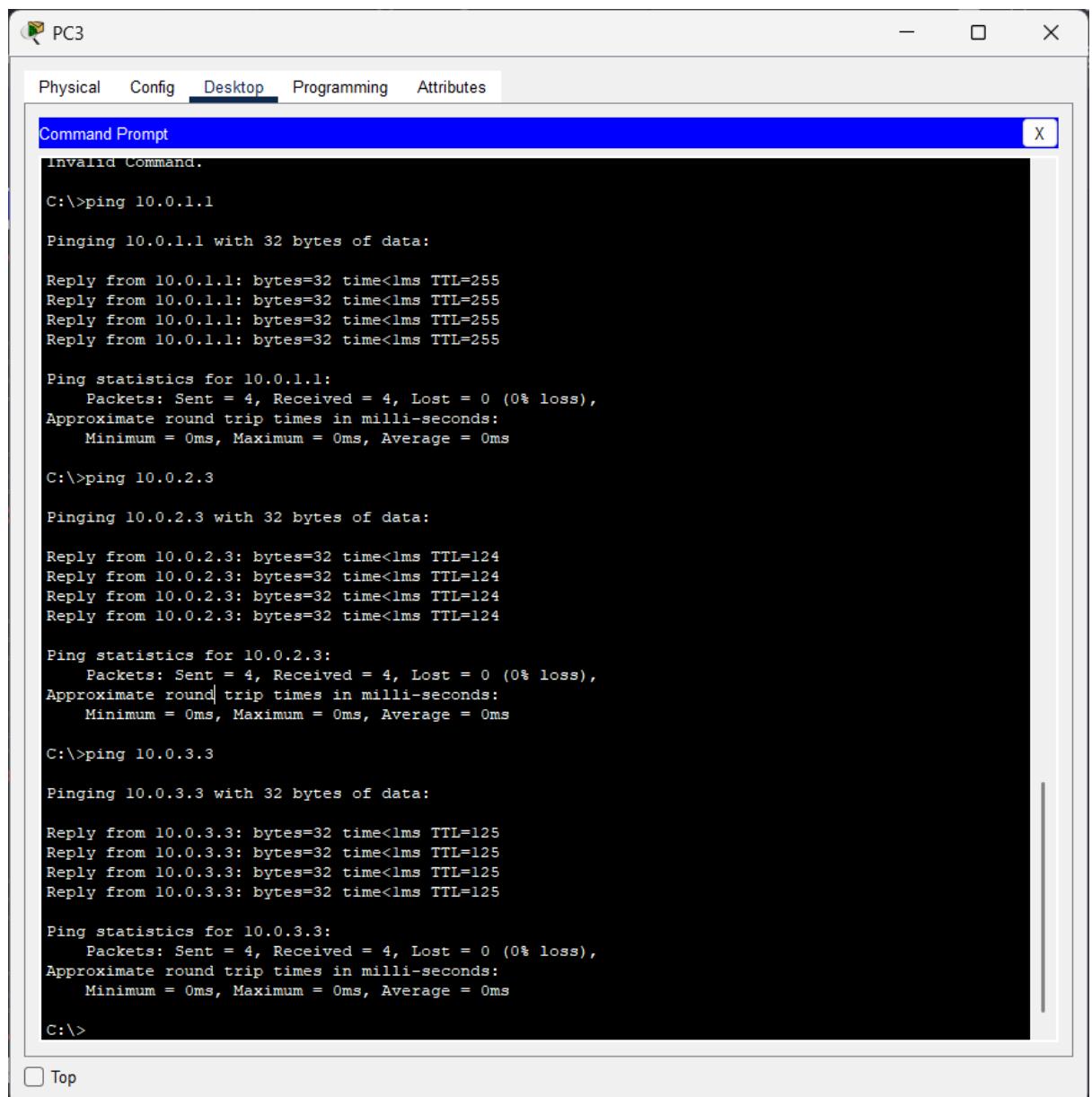
Pastikan:

- Router A memiliki entry untuk subnet 10.0.2.0 dan 10.0.3.0 melalui RIP.
- Router B dan Router C juga memiliki entry untuk semua subnet yang relevan (10.0.1.0, 10.0.2.0, 10.0.3.0, dan link point-to-point).

b) Pengujian Konektivitas (Ping dan Traceroute)

- **Ping:** Lakukan pengujian ping dari satu subnet ke subnet lainnya. Contoh:
 - Dari PC di Subnet 10.0.1.0 (yang terhubung ke Router A) ping ke IP interface pada Router C di Subnet 10.0.3.0 (10.0.3.1) untuk menguji konektivitas end-to-end.

PC SUBNET 10.0.1.0 (RIP)



```
PC3

Physical Config Desktop Programming Attributes

Command Prompt X
Invalid Command.

C:\>ping 10.0.1.1

Pinging 10.0.1.1 with 32 bytes of data:

Reply from 10.0.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.2.3

Pinging 10.0.2.3 with 32 bytes of data:

Reply from 10.0.2.3: bytes=32 time<1ms TTL=124

Ping statistics for 10.0.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.3.3

Pinging 10.0.3.3 with 32 bytes of data:

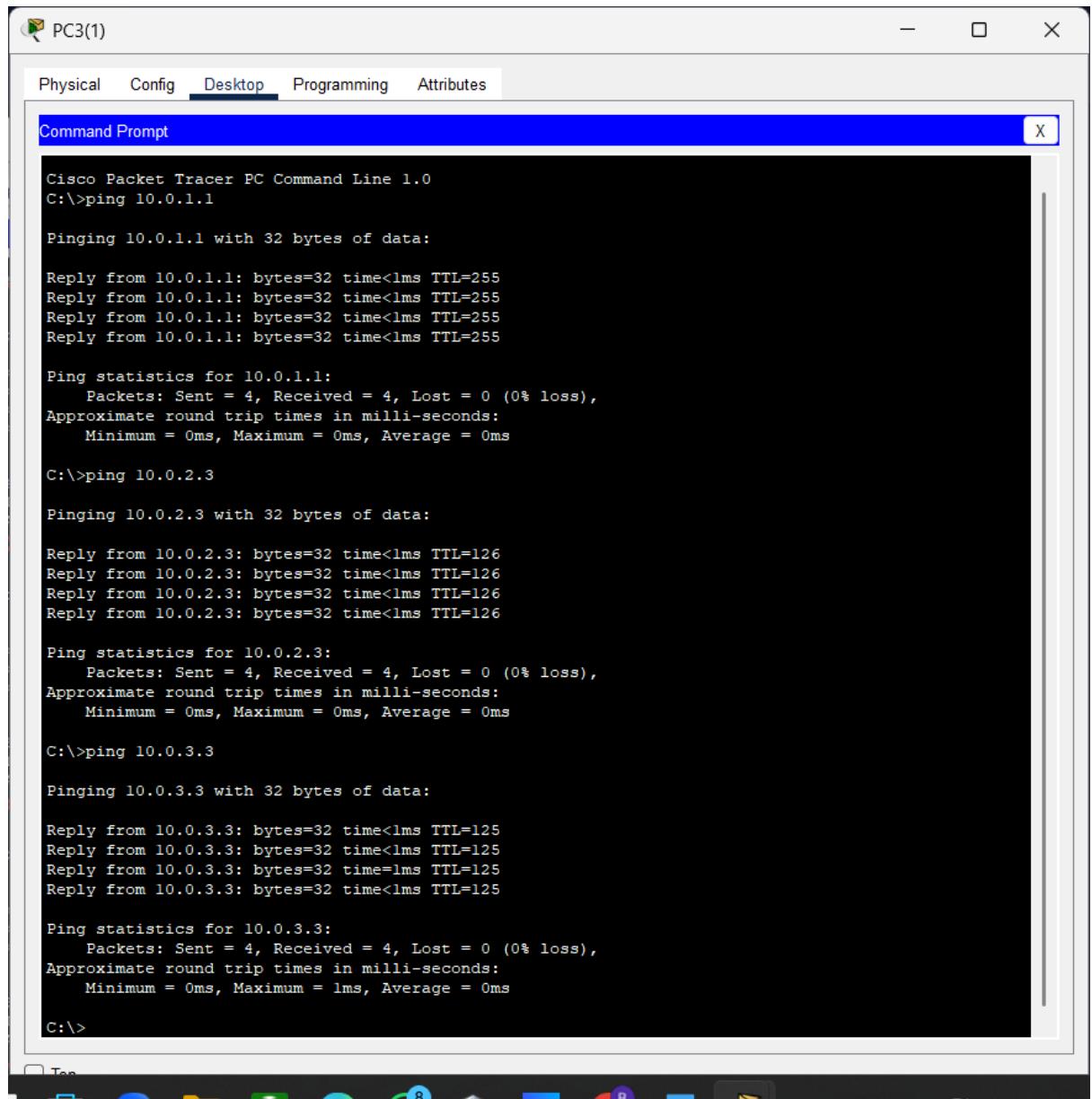
Reply from 10.0.3.3: bytes=32 time<1ms TTL=125

Ping statistics for 10.0.3.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Top

PC SUBNET 10.0.1.0 (OSPF)



The screenshot shows a Cisco Packet Tracer interface with a window titled "PC3(1)". The window has tabs: Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is selected. Inside the window, there is a "Command Prompt" window with the following text:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.1.1

Pinging 10.0.1.1 with 32 bytes of data:

Reply from 10.0.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.2.3

Pinging 10.0.2.3 with 32 bytes of data:

Reply from 10.0.2.3: bytes=32 time<1ms TTL=126

Ping statistics for 10.0.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.3.3

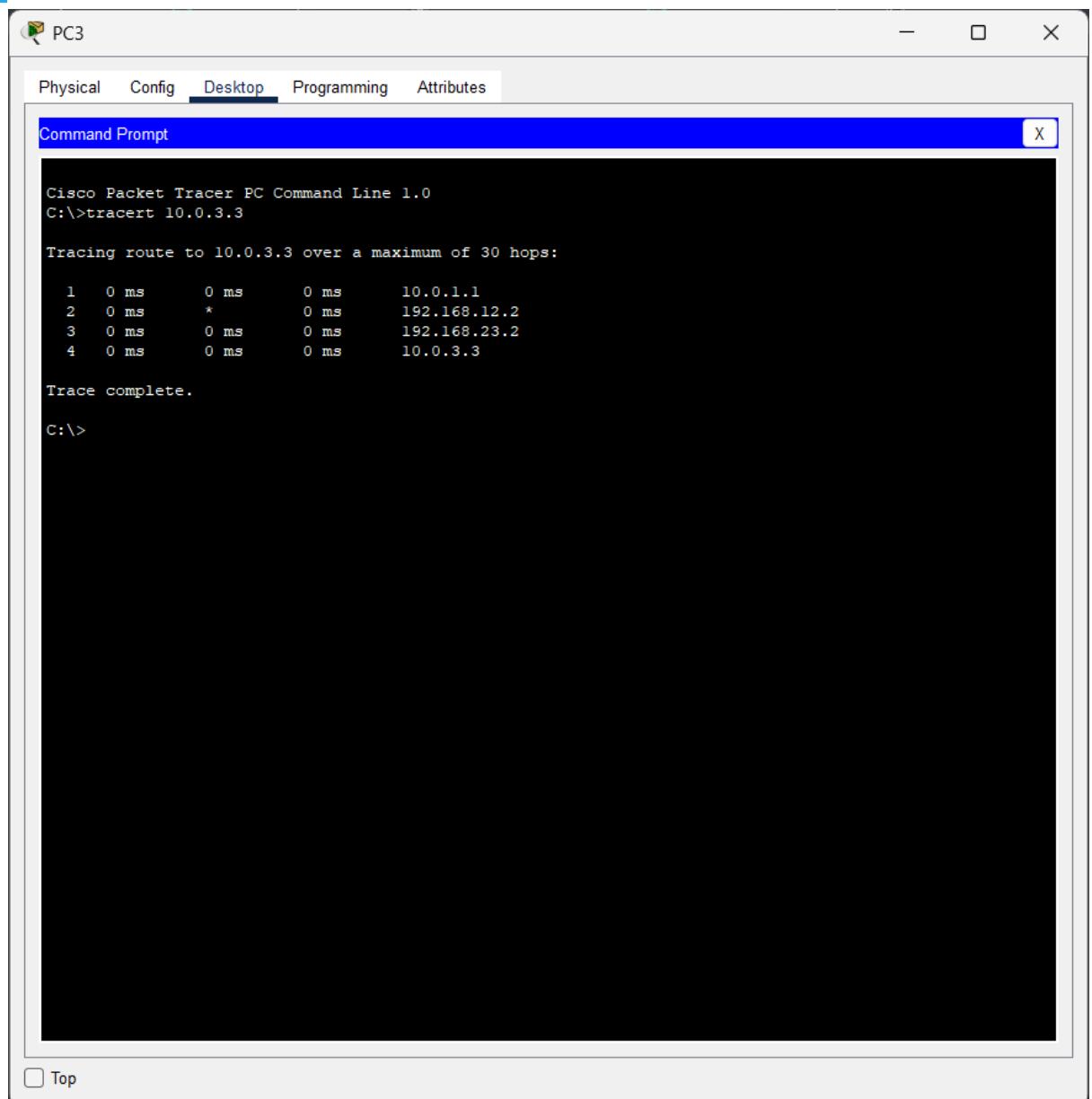
Pinging 10.0.3.3 with 32 bytes of data:

Reply from 10.0.3.3: bytes=32 time<1ms TTL=125
Reply from 10.0.3.3: bytes=32 time<1ms TTL=125
Reply from 10.0.3.3: bytes=32 time=1ms TTL=125
Reply from 10.0.3.3: bytes=32 time<1ms TTL=125

Ping statistics for 10.0.3.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

- **Traceroute:** Gunakan perintah **traceroute** untuk melacak jalur paket antar router dan memastikan paket mengikuti rute dinamis yang telah dikonfigurasi.



The image shows a screenshot of the Cisco Packet Tracer software interface, specifically the 'Desktop' tab. A command prompt window titled 'Command Prompt' is open, displaying the output of a 'tracert' command. The output shows the path from the local machine to a destination at 10.0.3.3, passing through three intermediate hosts.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>tracert 10.0.3.3

Tracing route to 10.0.3.3 over a maximum of 30 hops:
 1  0 ms      0 ms      0 ms      10.0.1.1
 2  0 ms      *         0 ms      192.168.12.2
 3  0 ms      0 ms      0 ms      192.168.23.2
 4  0 ms      0 ms      0 ms      10.0.3.3

Trace complete.

C:\>
```

The screenshot shows a Cisco Packet Tracer interface titled "PC4". A tab bar at the top includes "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". Below this is a "Command Prompt" window with a blue header bar containing the text "Command Prompt" and a close button (X). The main area of the window displays the following text:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>tracert 10.0.3.3

Tracing route to 10.0.3.3 over a maximum of 30 hops:

 1  0 ms      0 ms      0 ms      10.0.2.1
 2  0 ms      0 ms      0 ms      192.168.23.2
 3  0 ms      0 ms      0 ms      10.0.2.1

Trace complete.

C:\>
```

Jika Pengujian Gagal:

- Periksa kembali konfigurasi RIP atau OSPF pada setiap router.
- Pastikan semua interface aktif (gunakan show ip interface brief).
- Verifikasi kembali network statement pada konfigurasi routing untuk memastikan tidak ada kesalahan penulisan.

RouterA

Physical Config **CLI** Attributes

IOS Command Line Interface

```
(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
Image text-base: 0x2100F918, data-base: 0x24729040

This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Router>show ip interface brief
Interface          IP-Address      OK? Method Status        Protocol
GigabitEthernet0/0  10.0.1.1       YES manual up           up
GigabitEthernet0/1  192.168.12.1   YES manual up           up
GigabitEthernet0/2  unassigned     YES unset administratively down down
Vlan1              unassigned     YES unset administratively down down
Router>
```

Top

Copy **Paste**

RouterB

Physical Config **CLI** Attributes

IOS Command Line Interface

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#
Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/1
Router(config-if)#
*SYS-5-CONFIG_I: Configured from console by console

Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
Router(config-if)#{^Z
Router#
*SYS-5-CONFIG_I: Configured from console by console

Router#
Router#show ip interface brief
Interface          IP-Address      OK? Method Status           Protocol
GigabitEthernet0/0  192.168.12.2   YES manual up            up
GigabitEthernet0/1  10.0.2.1       YES manual up            up
GigabitEthernet0/2  192.168.23.1  YES manual up            up
Vlan1              unassigned     YES unset administratively down down
Router#
```

Top

RouterC

Physical Config **CLI** Attributes

IOS Command Line Interface

```
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

*LINPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
*LINPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#^Z
Router#
*SYS-5-CONFIG_I: Configured from console by console

Router#
Router#show ip interface brief
Interface          IP-Address      OK? Method Status        Protocol
GigabitEthernet0/0  192.168.23.2   YES manual up           up
GigabitEthernet0/1  10.0.3.1       YES manual up           up
GigabitEthernet0/2  unassigned     YES unset administratively down down
Vlan1              unassigned     YES unset administratively down down
Router#
```

Top

Copy **Paste**

Pemahaman Konsep

Konsep Dasar Routing Dinamis

Routing dinamis adalah metode di mana router secara otomatis memperbarui dan bertukar informasi rute dengan router lain dalam jaringan. Dengan menggunakan protokol routing dinamis, router dapat **menyesuaikan jalur terbaik** untuk mencapai tujuan tanpa perlu konfigurasi manual setiap kali ada perubahan dalam jaringan.

Keunggulan Routing Dinamis:

- Otomatis** – Tidak perlu konfigurasi manual setiap perubahan jaringan.
- Adaptif** – Dapat menyesuaikan jalur baru saat terjadi kegagalan jalur tertentu.
- Efisien** – Menggunakan algoritma untuk menentukan jalur terbaik berdasarkan metrik tertentu.

Namun, routing dinamis juga memiliki **kelemahan**, seperti **penggunaan lebih banyak sumber daya CPU dan memori** dibandingkan dengan routing statis.

Perbedaan antara RIP dan OSPF

Dua protokol routing dinamis yang umum digunakan adalah **RIP (Routing Information Protocol)** dan **OSPF (Open Shortest Path First)**.

Aspek	RIP	OSPF
Jenis Protokol	Distance Vector	Link-State
Cara Kerja	Mengandalkan jumlah hop untuk menentukan rute terbaik	Menggunakan Dijkstra's Algorithm untuk mencari jalur terpendek
Mekanisme Update	Update dikirim ke semua router setiap 30 detik	Hanya mengirim update ketika ada perubahan jaringan
Skalabilitas	Cocok untuk jaringan kecil	Cocok untuk jaringan besar
Konvergensi	Lambat , karena menunggu update berkala	Cepat , karena perubahan langsung disebarluaskan
Penggunaan Bandwidth	Lebih tinggi karena update dikirim terus-menerus	Lebih rendah karena hanya mengupdate perubahan
Dukungan CIDR & VLSM	RIP v1 tidak mendukung , RIP v2 mendukung	Mendukung CIDR dan VLSM

Keamanan	Tidak memiliki otentikasi bawaan (pada RIP v1)	Bisa menggunakan otentikasi
Implementasi	Konfigurasi sederhana , mudah diimplementasikan	Konfigurasi lebih kompleks , tetapi lebih fleksibel

Kesimpulan:

- **Gunakan RIP** jika jaringan **kecil**, karena lebih mudah dikonfigurasi.
 - **Gunakan OSPF** jika jaringan **besar dan kompleks**, karena lebih efisien dan cepat.
-

Mekanisme Update Routing Secara Otomatis

Routing dinamis memperbarui tabel routing melalui **pertukaran informasi rute** antar router dalam jaringan. Proses ini berbeda tergantung protokol yang digunakan:

1. **Mekanisme Update pada RIP:**

- Router mengirim **seluruh isi tabel routing** ke router tetangga setiap **30 detik**.
- Menggunakan **hop count** untuk menentukan rute terbaik.
- Jika hop count mencapai **lebih dari 15**, tujuan dianggap **tidak dapat dijangkau** (loop prevention).
- **Kelemahan:** Update yang terus-menerus dapat membebani jaringan.

2. **Mekanisme Update pada OSPF:**

- Router membangun **Link-State Database (LSDB)** yang berisi informasi semua jaringan dalam area OSPF.
 - Saat ada perubahan, hanya **perubahan rute** yang dikirim ke router tetangga, bukan seluruh tabel.
 - Menggunakan **algoritma Dijkstra** untuk menghitung rute terbaik berdasarkan **cost (metrik berdasarkan bandwidth)**.
 - **Keunggulan:** Konvergensi lebih cepat dan penggunaan bandwidth lebih efisien dibandingkan RIP.
-

Kesimpulan

- ✓ **Routing dinamis** sangat berguna untuk jaringan yang besar dan sering mengalami perubahan.
- ✓ **RIP** lebih mudah dikonfigurasi tetapi kurang efisien untuk jaringan besar.
- ✓ **OSPF** lebih kompleks tetapi lebih optimal untuk jaringan yang luas dan dinamis.
- ✓ Dengan **mekanisme update otomatis**, router dapat menyesuaikan rute terbaik tanpa campur tangan administrator secara manual. 

Tautan Github:

<https://github.com/DeathMoonerg/DMJK-10231080>