

Laboratorium
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Laporan Akhir Praktikum Jaringan Komputer

Routing & Manajemen IPv6

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1 Langkah-Langkah Percobaan

1.1 Routing Statis IPv6

1. Reset router melalui Winbox. Di dalam Winbox, akses menu System, pilih Reset Configuration. Setelah reset, login kembali ke router via Winbox menggunakan alamat MAC atau IP default, dengan akun admin tanpa kata sandi.
2. Aktifkan IPv6. Pilih menu System, lalu pilih Packages. Pilih paket "ipv6" dalam daftar. Agar paket IPv6 teraplikasikan sepenuhnya dan muncul di menu utama Winbox, router harus di-reboot melalui System → Reboot.
3. Jika setelah konfigurasi IPv6 selesai router masih belum terhubung antar-perangkat, maka proses troubleshooting dapat dilakukan. Langkah-langkah troubleshooting adalah sebagai berikut:
 - Pertama-tama, pastikan firewall pada laptop yang terkoneksi dengan router telah dinonaktifkan secara total. Penonaktifan ini bisa dilakukan melalui pengaturan sistem atau Control Panel di masing-masing laptop.
 - Jika setelah langkah-langkah sebelumnya menu IPv6 belum juga tampil di antarmuka router, ada baiknya untuk melakukan pemeriksaan ulang. Pastikan kembali bahwa paket IPv6 pada router sudah benar-benar diaktifkan (enable) dan router telah di-restart (reboot) setelah aktivasi tersebut.
 - Apabila semua prosedur tersebut, mulai dari penonaktifan firewall hingga aktivasi dan reboot router, telah dilaksanakan dengan benar, maka menu IPv6 seharusnya sudah muncul. Dengan munculnya menu ini, router kini siap untuk proses konfigurasi IPv6 lebih lanjut.
4. Tetapkan alamat IP 2001:db8:1::1/64 pada ether1 Router A dan 2001:db8:1::2/64 pada ether1 Router B untuk koneksi antar-router, serta 2001:db8:a::1/64 pada ether2 Router A dan 2001:db8:b::1/64 pada ether2 Router B untuk jaringan LAN masing-masing.
5. Langkah berikutnya adalah menambahkan rute statis secara manual agar kedua subnet bisa saling terhubung. Akses menu IPv6 -> Routes, lalu input alamat tujuan beserta gateway-nya. Untuk Router A, tujuannya adalah 2001:db8:b::/64 melalui gateway 2001:db8:1::2. Sebaliknya, pada Router B, tujuannya 2001:db8:a::/64 dengan gateway 2001:db8:1::1. Uji konektivitas antar-router dengan membuka terminal di Router A dan melakukan ping ke LAN Router B (2001:db8:b::1), kemudian lakukan tes serupa dari Router B ke LAN Router A (2001:db8:a::1).
6. Setelah memastikan router-router dapat saling terhubung, langkah berikutnya adalah mengonfigurasi laptop yang tersambung ke masing-masing router. Karena pengaturan IP masih statis, alamat IP pada antarmuka setiap laptop perlu diatur manual. Laptop yang terhubung ke Router A diberikan IP 2001:db8:a::100/64, gateway 2001:db8:a::1, dan DNS 2001:4860:4860::8888. Sementara itu, laptop pada jaringan Router B menggunakan IP 2001:db8:b::100 dengan gateway 2001:db8:b::1. Jika semua konfigurasi telah selesai, lakukan uji ping antar-laptop. Ping yang berhasil menandakan bahwa routing statis telah berfungsi dengan benar.

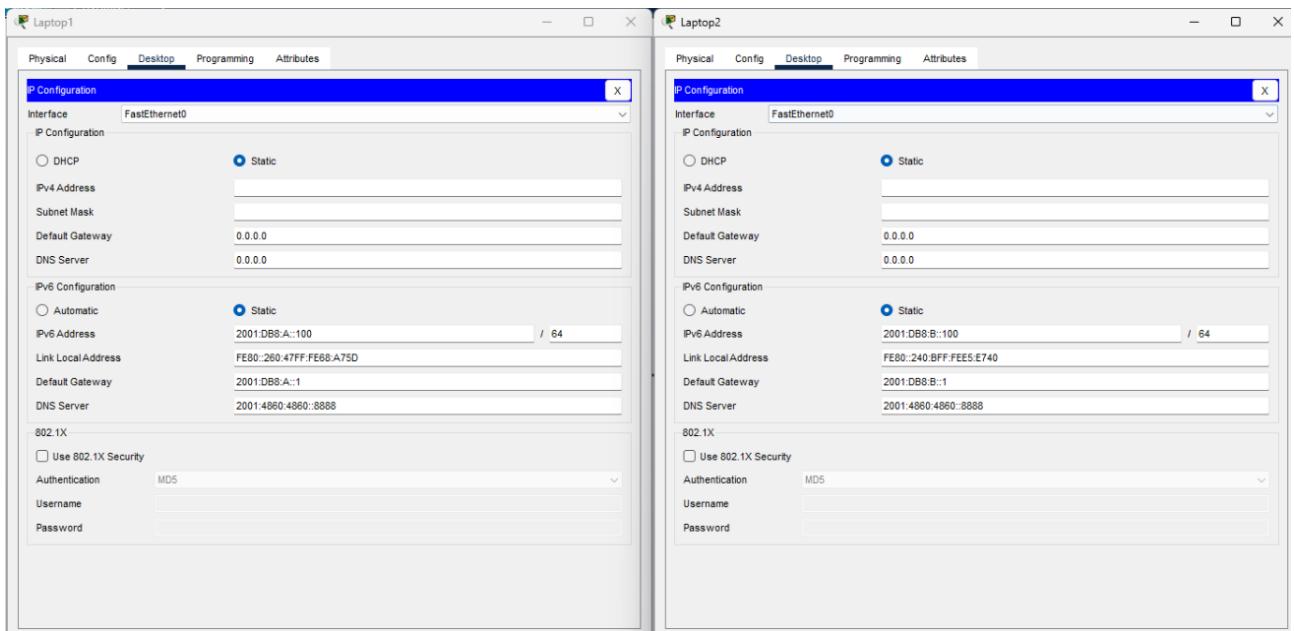
1.2 Routing Dimanis IPv6

1. Untuk konfigurasi routing dinamis IPv6 dengan OSPFv3, langkah persiapan awalnya sama: reset router dan login ke Winbox. Pengaturan alamat IP juga identik, yaitu 2001:db8:1::1/64 untuk ether1 Router A, 2001:db8:1::2/64 untuk ether1 Router B, serta 2001:db8:a::1/64 untuk ether2 Router A dan 2001:db8:b::1/64 untuk ether2 Router B. Setelah IP terkonfigurasi, langkah selanjutnya adalah mengaktifkan routing OSPFv3.
2. Untuk memulai aktivasi OSPFv3, navigasikan ke IPv6 -> Routing -> OSPFv3 -> Instances. Di sana, buat sebuah instance baru, beri nama (contoh: 'ospf-instance'), dan tentukan Router ID, misalnya 1.1.1.1 untuk Router A dan 2.2.2.2 untuk Router B.
3. Berikutnya, akses menu Areas, lalu buat area baru bernama 'backbone'. Atur Area ID ke 0.0.0.0 dan pastikan instance yang dipilih adalah yang baru saja dibuat.
4. Kemudian, tentukan antarmuka (interface) yang akan berpartisipasi dalam OSPFv3 melalui menu Interface. Daftarkan ether1 sebagai antarmuka penghubung antar-router dan ether2 sebagai antarmuka ke jaringan LAN, baik di Router A maupun di Router B.
5. Pilih menu IPv6 → Routes masukkan IP 2001:db8:a::/64 pada router A atau 2001:db8:b::/64 pada router B.
6. Uji ping dari Router A ke LAN Router B dan sebaliknya untuk memastikan routing dinamis telah terkonfigurasi.
7. Device pada Router A menggunakan IP 2001:db8:a::100 dan gateway 2001:db8:a::1, sementara device pada router B menggunakan IP 2001:db8:b::100 dan gateway 2001:db8:b::1. Lalu ping antar device, maka konfigurasi IPv6 telah berhasil dan routing dinamis berjalan baik.

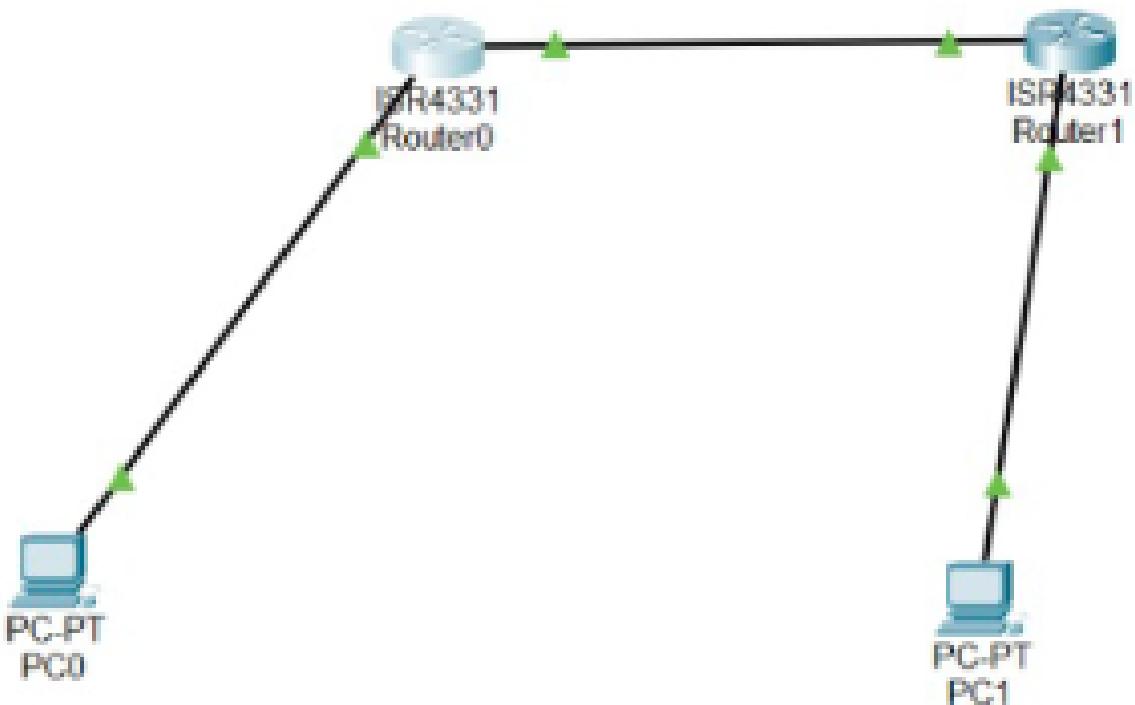
2 Analisis Hasil Percobaan

Pada uji coba konfigurasi routing statis, teramatinya bahwa laptop 1 menerima balasan saat melakukan PING ke laptop 2. Hal serupa juga teridentifikasi pada konfigurasi routing dinamis, di mana laptop 1 juga memperoleh respons dari laptop 2 saat pengujian PING dilakukan.

3 Hasil Tugas Modul



Gambar 2: Konfigurasi IP pada Device



Gambar 1: Topologi Cisco

4 Kesimpulan

Kesimpulan pada praktikum kali ini adalah keberhasilan konfigurasi routing pada jaringan IPv6 melalui dua pendekatan, yaitu routing statis dan routing dinamis menggunakan OSPFv3 di mana

```

Router1
Current configuration : 832 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
!
!
ip cef
ipv6 unicast-routing
!
no ipv6 cef
!
!
Router#sh ipv6 int br
GigabitEthernet0/0          [up/up]
  FE80::201:63FF:FE18:3901
  2001:DB8:2::1
  2001:DB8:AB::1
GigabitEthernet0/1          [up/up]
  FE80::201:63FF:FE18:3902
  2001:DB8:1::1
  2001:DB8:A::1
Vlan1                         [administratively down/down]
  unassigned
Router#

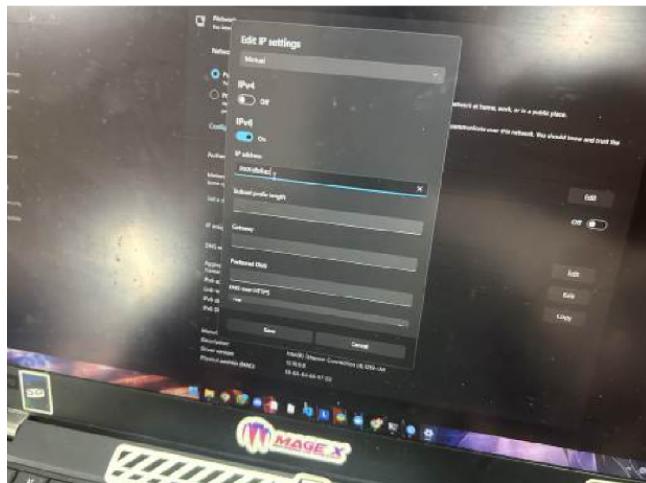

Router2
Current configuration : 747 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
!
!
ip cef
ipv6 unicast-routing
!
no ipv6 cef
!
Router#sh ipv6 int br
GigabitEthernet0/0          [up/up]
  FE80::201:94FF:FE00:C01
  2001:DB8:B::1
  2001:DB8:AB::2
GigabitEthernet0/1          [up/up]
  FE80::201:94FF:FE00:C02
  2001:DB8:B::1
Vlan1                         [administratively down/down]
  unassigned
Router#

```

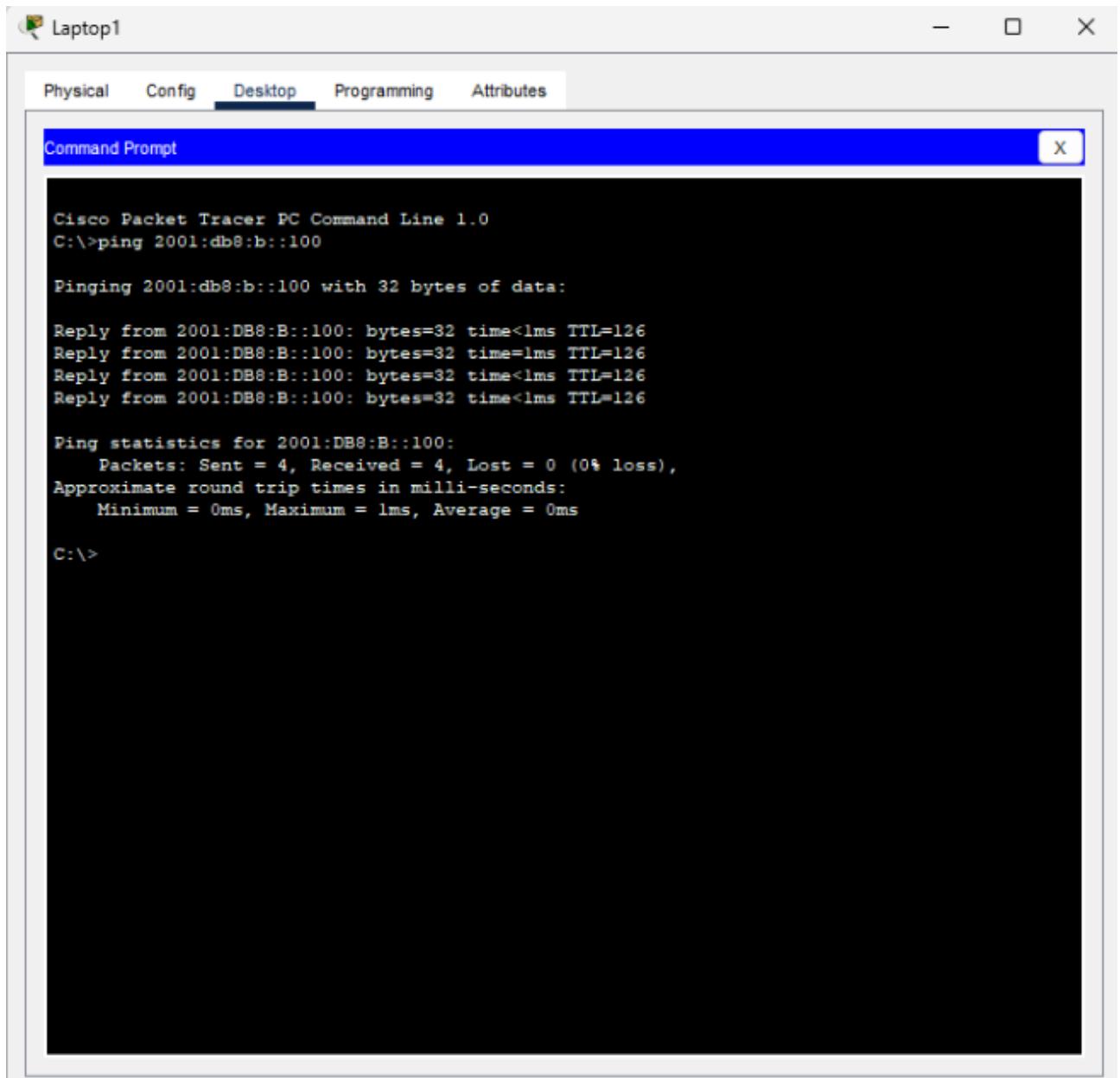
Gambar 3: Konfigurasi IP pada Router

pertukaran informasi rute terjadi otomatis setelah diaktifkan dan dikonfigurasi dengan benar. Kedua metode mampu menghubungkan jaringan melalui uji ping antar-router maupun antar-laptop, namun routing dinamis OSPFv3 lebih fleksibel untuk jaringan kompleks karena dapat menyesuaikan perubahan topologi tanpa konfigurasi ulang manual. Praktikan menjadi mengerti mengenai pengaktifan fitur IPv6, konfigurasi alamat IP dan gateway, manajemen rute pada Mikrotik, serta implementasi OSPFv3, sekaligus menegaskan pentingnya manajemen jaringan yang tepat untuk komunikasi lancar di lingkungan jaringan berbasis IPv6.

5 Lampiran



Gambar 10: Konfigurasi IPv6 pada Laptop



Laptop1

Physical Config Desktop Programming Attributes

Command Prompt X

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 2001:db8:b::100

Pinging 2001:db8:b::100 with 32 bytes of data:

Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:B::100: bytes=32 time=1ms TTL=126
Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=126

Ping statistics for 2001:DB8:B::100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

Gambar 4: Ping Device 1 to 2

The screenshot shows a 'Command Prompt' window titled 'Cisco Packet Tracer PC Command Line 1.0'. The window contains the following text output:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 2001:db8:a::100

Pinging 2001:db8:a::100 with 32 bytes of data:

Reply from 2001:DB8:A::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:A::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:A::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:A::100: bytes=32 time=13ms TTL=126

Ping statistics for 2001:DB8:A::100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 13ms, Average = 3ms

C:\>
```

Gambar 5: Ping Device 2 to 1

```

Router1# show ip route ospf
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
        O - OSPF intra, OI - OSPF inter, OEL - OSPF ext 1, OE2 - OSPF ext 2
        ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
        D - EIGRP, EX - EIGRP external
        Router# configure terminal
        Enter configuration commands, one per line. End with CNTL/Z.
        Router(config)#int gigabitethernet 0/1
        Router(config-if)#ipv6 address 2001:db8:a::1/64
        Router(config-if)#ipv6 1 area 0
        Router(config-if)#
        * Invalid input detected at `--` marker.

        Router(config-if)#ipv6 ospf 1 area 0
        Router(config-if)#no shutdown
        Router(config-if)#exit
        Router(config)#
        *SYS-5-CONFIG_I: Configured from console by console
        show ipv6 route ospf
        IPv6 Routing Table - 11 entries
        Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
                U - Per-user Static route, M - MIPv6
                I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
                O - OSPF intra, OI - OSPF inter, OEL - OSPF ext 1, OE2 - OSPF ext 2
                ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
                D - EIGRP, EX - EIGRP external
        Router# 01:10:08: %OSPFV3-5-ADJCHG: Process 1, Nbr 2.2.2.2 on GigabitEthernet0/0 from LOADING to FULL, Loading Done
        Router# 

Router2# show ip route ospf
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
        U - Per-user Static route, M - MIPv6
        I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
        O - OSPF intra, OI - OSPF inter, OEL - OSPF ext 1, OE2 - OSPF ext 2
        ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
        D - EIGRP, EX - EIGRP external
        Router# configure terminal
        Enter configuration commands, one per line. End with CNTL/Z.
        Router(config)#int gigabitethernet 0/1
        Router(config-if)#ipv6 address 2001:db8:b::1/64
        Router(config-if)#ipv6 ospf 1 area 0
        Router(config-if)#no shutdown
        Router(config-if)#
        * Invalid input detected at `--` marker.

        Router(config-if)#ipv6 ospf 1 area 0
        Router(config-if)#exit
        Router(config)#
        *SYS-5-CONFIG_I: Configured from console by console
        show ipv6 route ospf
        IPv6 Routing Table - 9 entries
        Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
                U - Per-user Static route, M - MIPv6
                I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
                O - OSPF intra, OI - OSPF inter, OEL - OSPF ext 1, OE2 - OSPF ext 2
                ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
                D - EIGRP, EX - EIGRP external
        O 2001:DB8:1::/64 [110/2]
          via FE80::201:63FF:FE18:3901, GigabitEthernet0/0
        Router# 

```

Gambar 6: Konfigruasi OSPF

```

Router1# show ip route ospf
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
        O - OSPF intra, OI - OSPF inter, OEL - OSPF ext 1, OE2 - OSPF ext 2
        ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
        D - EIGRP, EX - EIGRP external
        Router# configure terminal
        Enter configuration commands, one per line. End with CNTL/Z.
        Router(config)#int gigabitethernet 0/1
        Router(config-if)#ipv6 address 2001:db8:a::1/64
        Router(config-if)#ipv6 1 area 0
        Router(config-if)#
        * Invalid input detected at `--` marker.

        Router(config-if)#ipv6 ospf 1 area 0
        Router(config-if)#no shutdown
        Router(config-if)#exit
        Router(config)#
        *SYS-5-CONFIG_I: Configured from console by console
        show ipv6 route ospf
        IPv6 Routing Table - 11 entries
        Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
                U - Per-user Static route, M - MIPv6
                I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
                O - OSPF intra, OI - OSPF inter, OEL - OSPF ext 1, OE2 - OSPF ext 2
                ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
                D - EIGRP, EX - EIGRP external
        Router# 01:10:08: %OSPFV3-5-ADJCHG: Process 1, Nbr 2.2.2.2 on GigabitEthernet0/0 from LOADING to FULL, Loading Done
        Router# 

Router2# show ip route ospf
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
        U - Per-user Static route, M - MIPv6
        I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
        O - OSPF intra, OI - OSPF inter, OEL - OSPF ext 1, OE2 - OSPF ext 2
        ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
        D - EIGRP, EX - EIGRP external
        Router# configure terminal
        Enter configuration commands, one per line. End with CNTL/Z.
        Router(config)#int gigabitethernet 0/1
        Router(config-if)#ipv6 address 2001:db8:b::1/64
        Router(config-if)#ipv6 ospf 1 area 0
        Router(config-if)#no shutdown
        Router(config-if)#
        * Invalid input detected at `--` marker.

        Router(config-if)#ipv6 ospf 1 area 0
        Router(config-if)#exit
        Router(config)#
        *SYS-5-CONFIG_I: Configured from console by console
        show ipv6 route ospf
        IPv6 Routing Table - 9 entries
        Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
                U - Per-user Static route, M - MIPv6
                I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
                O - OSPF intra, OI - OSPF inter, OEL - OSPF ext 1, OE2 - OSPF ext 2
                ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
                D - EIGRP, EX - EIGRP external
        O 2001:DB8:1::/64 [110/2]
          via FE80::201:63FF:FE18:3901, GigabitEthernet0/0
        Router# 

```

Gambar 7: Konfigruasi OSPF

Laptop1

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 2001:db8:b::100

Pinging 2001:db8:b::100 with 32 bytes of data:

Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:B::100: bytes=32 time=1ms TTL=126
Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=126

Ping statistics for 2001:DB8:B::100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 2001:db8:b::100

Pinging 2001:db8:b::100 with 32 bytes of data:

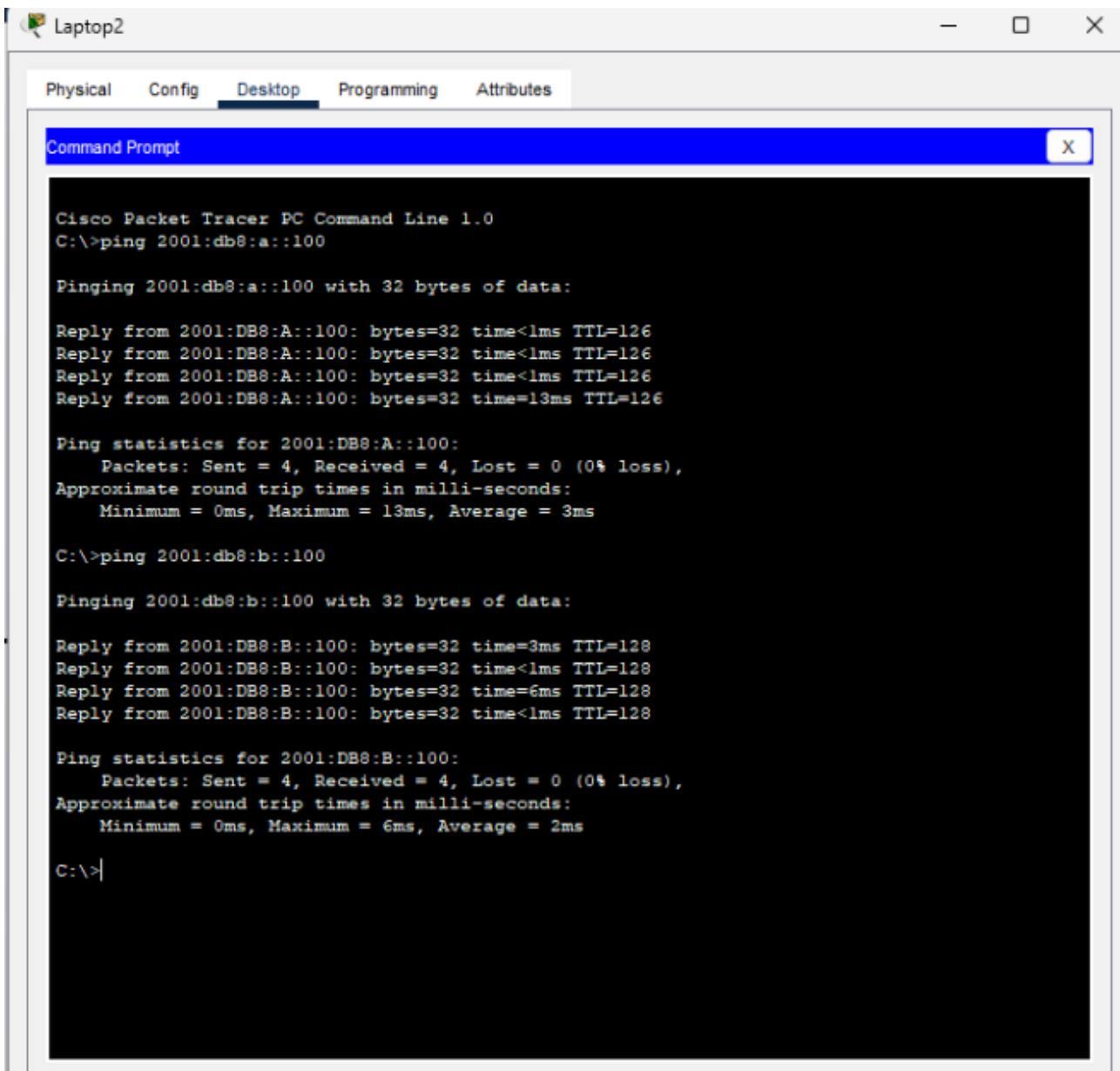
Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:B::100: bytes=32 time=1ms TTL=126
Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=126

Ping statistics for 2001:DB8:B::100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

Top

Gambar 8: Hasil OSPF Ping Laptop 1 ke Laptop 2



Laptop2

Physical Config Desktop Programming Attributes

Command Prompt X

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 2001:db8:a::100

Pinging 2001:db8:a::100 with 32 bytes of data:

Reply from 2001:DB8:A::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:A::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:A::100: bytes=32 time<1ms TTL=126
Reply from 2001:DB8:A::100: bytes=32 time=13ms TTL=126

Ping statistics for 2001:DB8:A::100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 13ms, Average = 3ms

C:\>ping 2001:db8:b::100

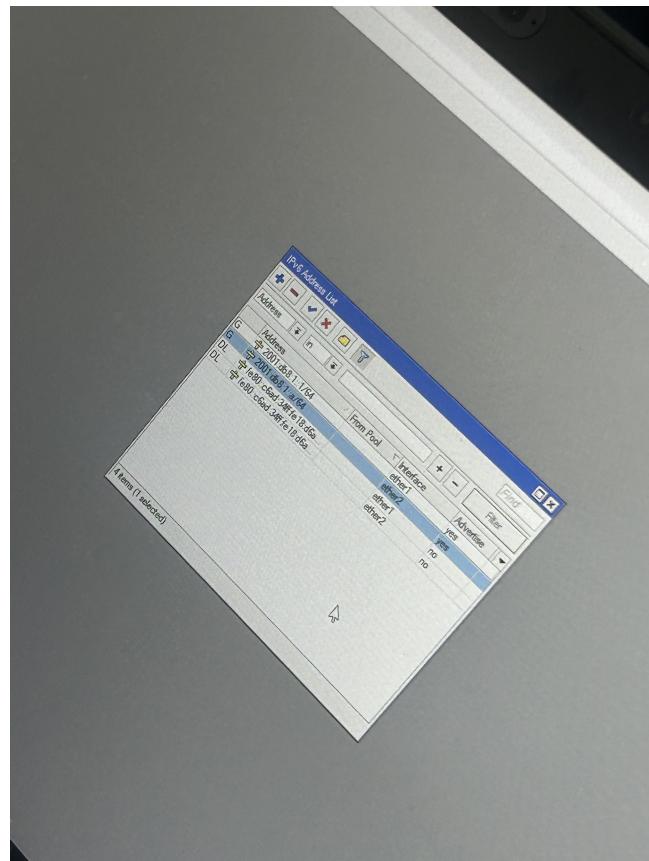
Pinging 2001:db8:b::100 with 32 bytes of data:

Reply from 2001:DB8:B::100: bytes=32 time=3ms TTL=128
Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=128
Reply from 2001:DB8:B::100: bytes=32 time=6ms TTL=128
Reply from 2001:DB8:B::100: bytes=32 time<1ms TTL=128

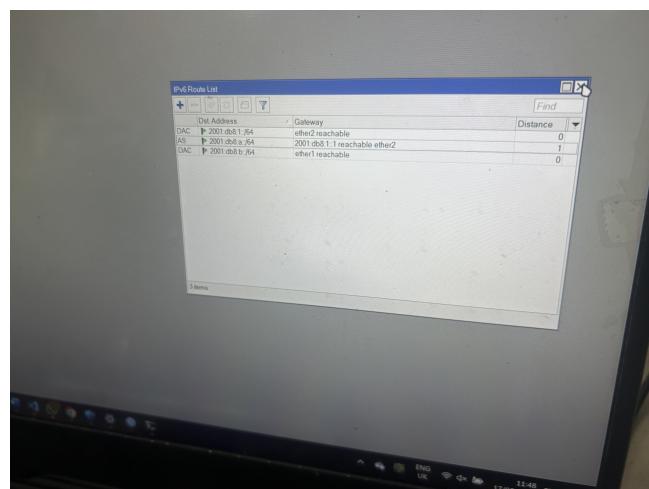
Ping statistics for 2001:DB8:B::100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 2ms

C:\>
```

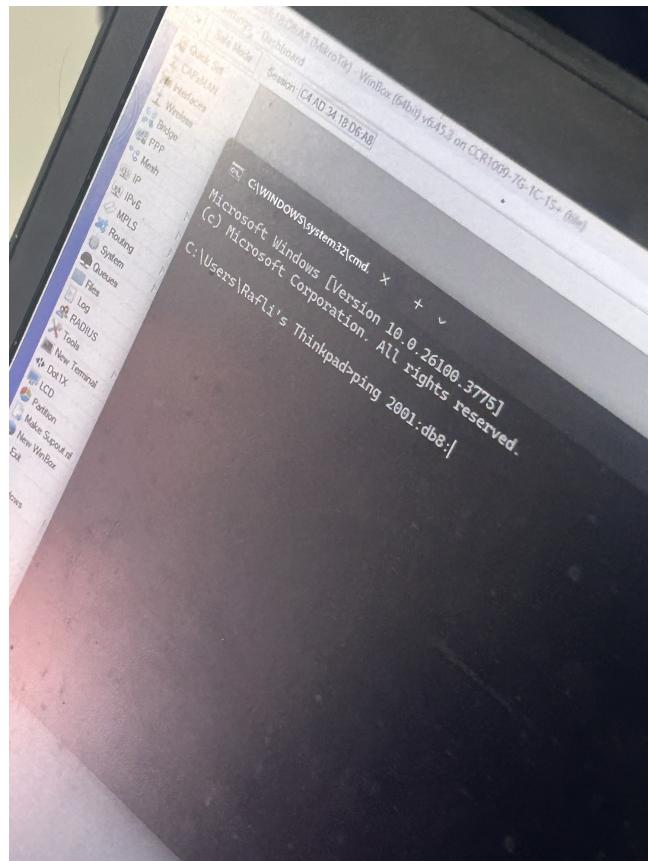
Gambar 9: Hasil OSPF Ping Laptop 2 ke Laptop 1



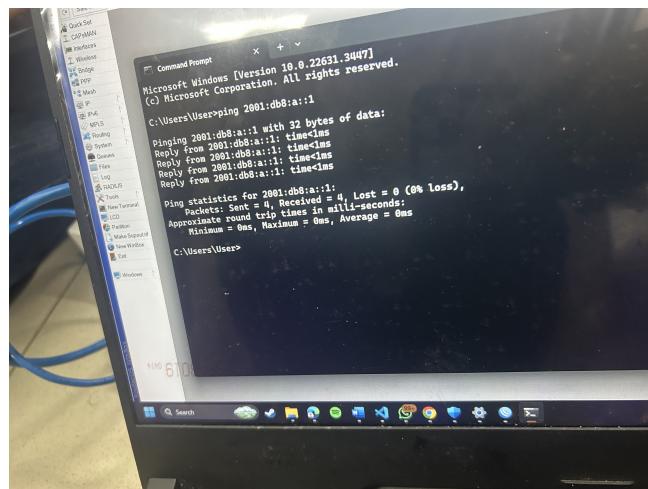
Gambar 11: Konfigurasi IP



Gambar 12: Konfigurasi Routing Statis



Gambar 13: Ping Tes



Gambar 14: Ping to Laptop 1