Laboratorium
Multimedia dan Internet of Things
Departemen Teknik Komputer
Institut Teknologi Sepuluh Nopember

Laporan Akhir
Praktikum Jaringan Komputer

Routing & Manajemen IPv6

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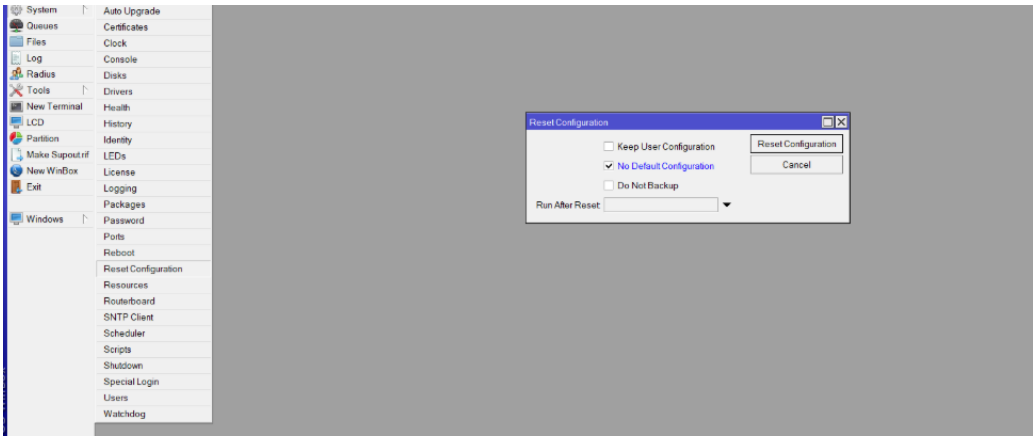
2025

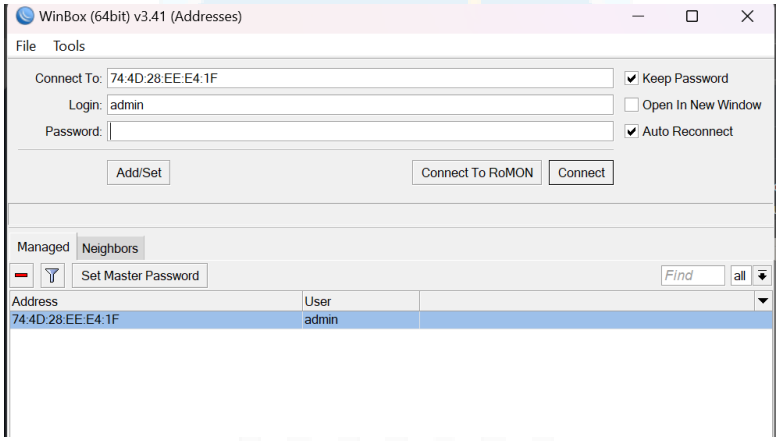
1 Langkah-Langkah Percobaan

1.1 Sebelum Routing

1. Reset Router melalui Winbox pada menu System -> Reset Configuration



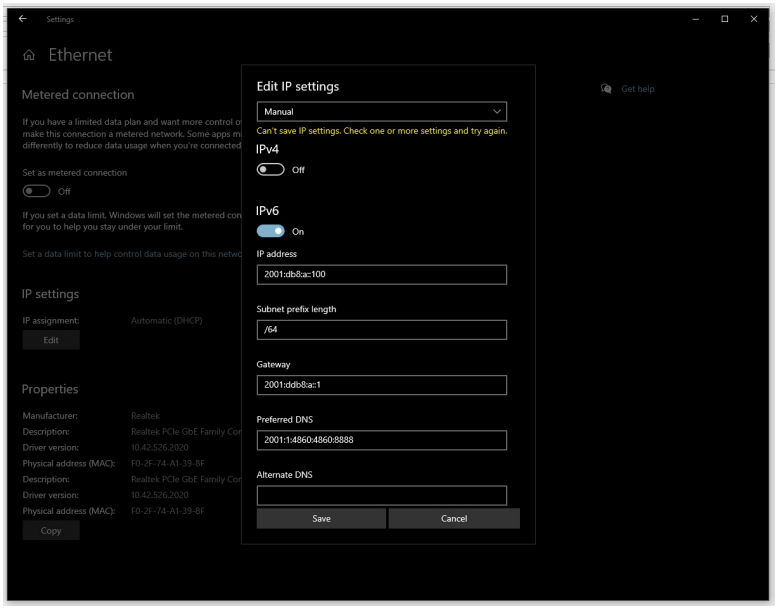
2. Login ke router melalui Winbox dalam keadaan tidak ada password kemudian klik "connect"



3. Aktifkan Paket IPv6

   - Masuk ke menu `System → Packages`.
   - Pilih `IPv6`, klik `Enable` jika belum aktif.
   - Reboot router melalui menu `System → Reboot`.

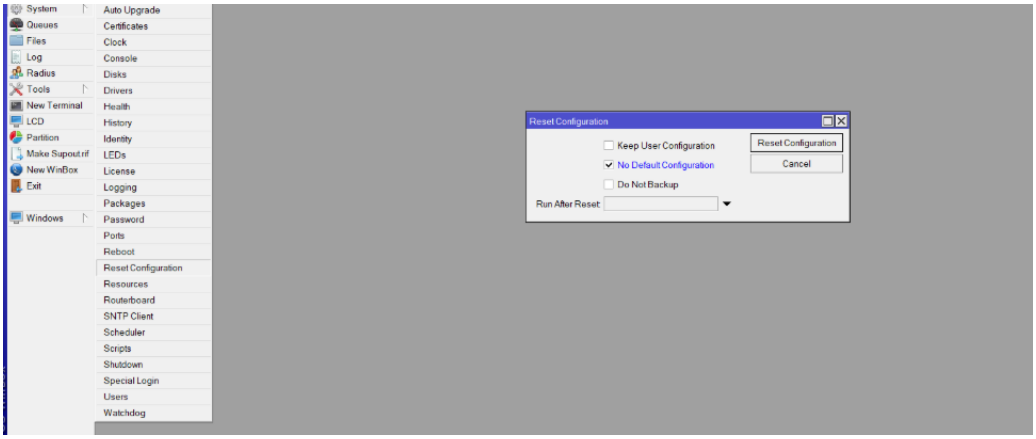
4. Nonaktifkan Firewall Laptop melalui Settings windows



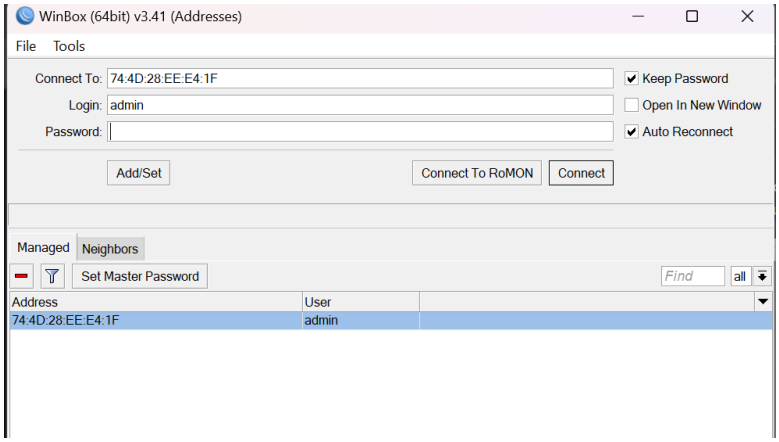
5. Login kembali menggunakan Winbox. Pastikan menu `IPv6` sudah muncul.

1.2 Routing Static IPv6

1. Reset Router melalui Winbox pada menu System -> Reset Configuration

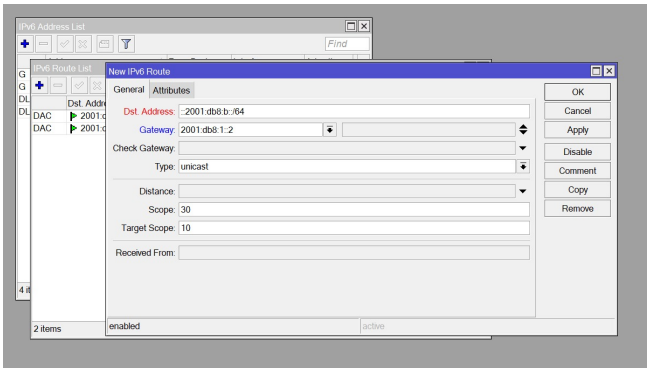


2. Login ke router melalui Winbox dalam keadaan tidak ada password kemudian klik "connect"



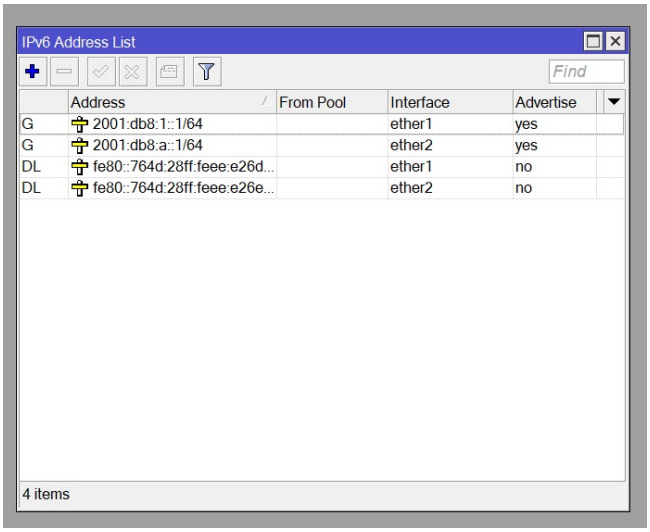
3. Konfigurasi IP Antar-Router

    - Router A (ether1): `2001:db8:1::1/64`
    - Router B (ether1): `2001:db8:1::2/64`



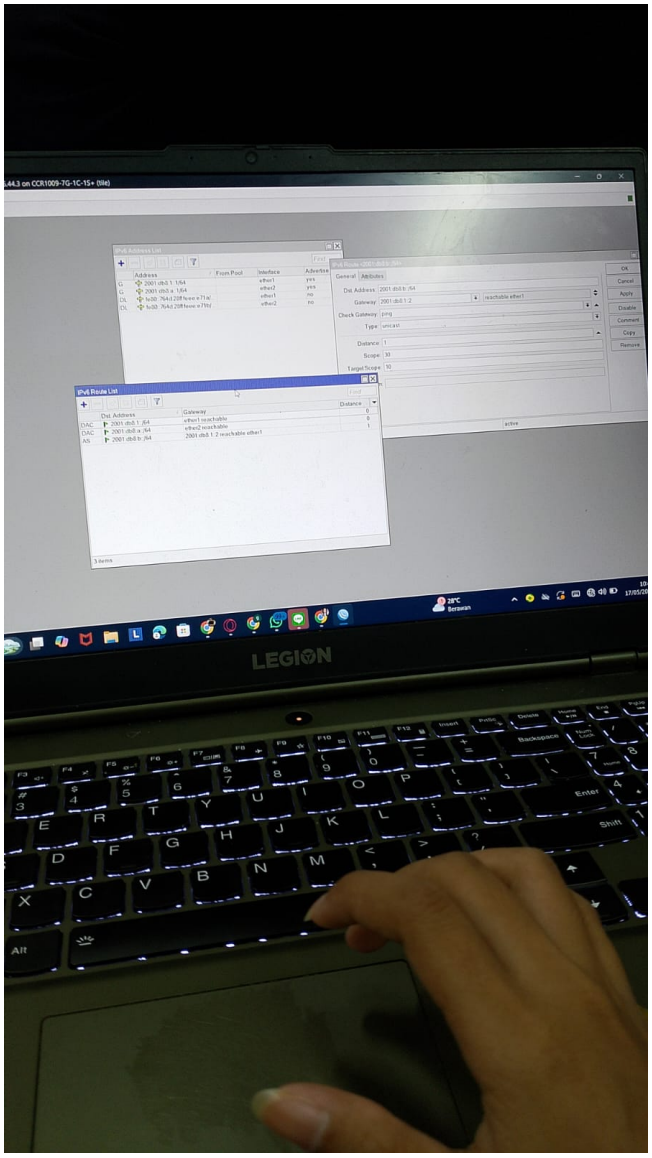
4. Konfigurasi IP Jaringan LAN

    - Router A (ether2): `2001:db8:a::1/64`
    - Router B (ether2): `2001:db8:b::1/64`



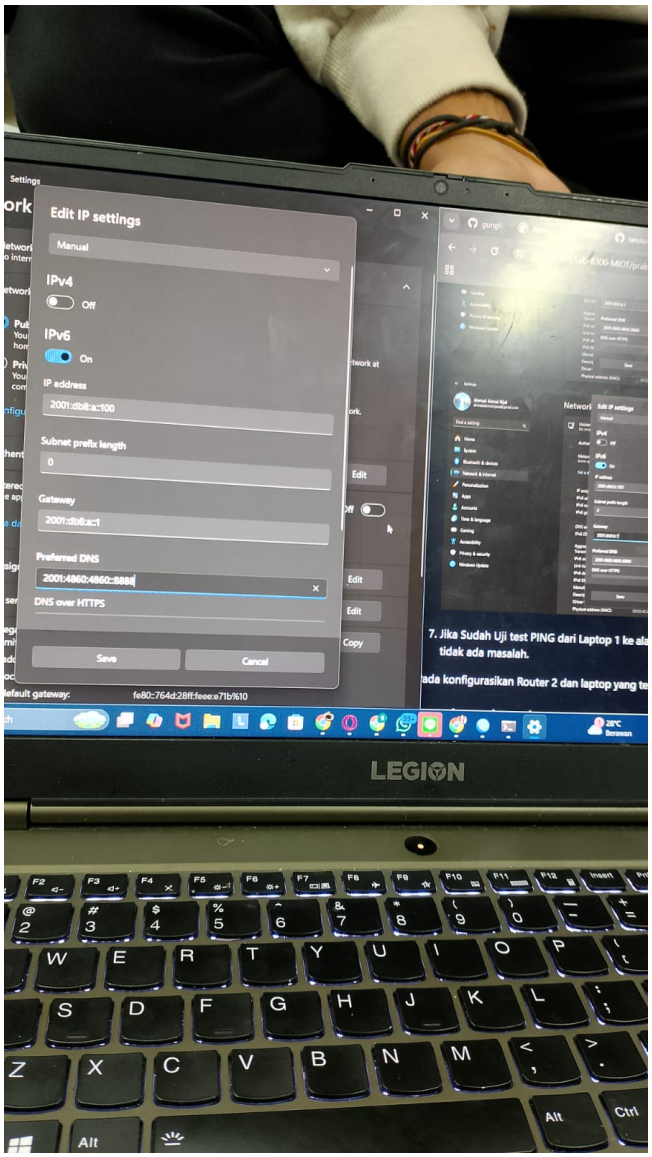
5. Tambahkan Routing Statis

- Router A:
  - Destination: `2001:db8:b::/64`
  - Gateway: `2001:db8:1::2`
- Router B:
  - Destination: `2001:db8:a::/64`
  - Gateway: `2001:db8:1::1`



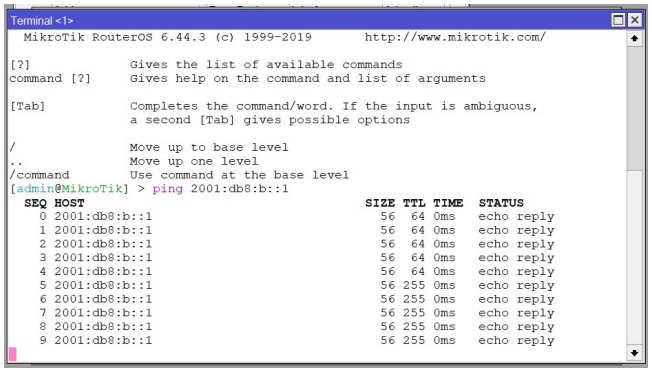
6. Konfigurasi IP di Laptop
   - Laptop ke Router A:
     - IP: `2001:db8:a::100/64`
     - Gateway: `2001:db8:a::1`
     - DNS: `2001:4860:4860::8888`
   - Laptop ke Router B:
     - IP: `2001:db8:b::100/64`
     - Gateway: `2001:db8:b::1`

– DNS: `2001:4860:4860::8888`



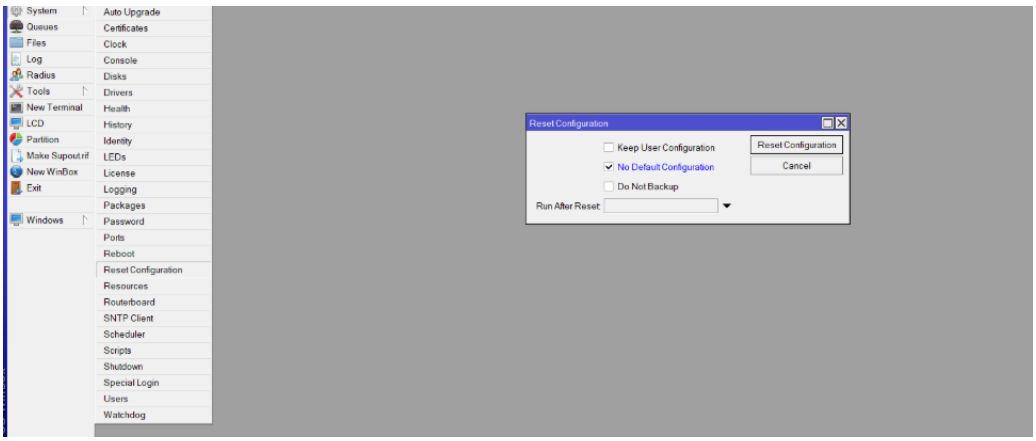
7. Uji Koneksi

- Ping dari Router A ke `2001:db8:b::1`
- Ping dari Router B ke `2001:db8:a::1`
- Ping dari Laptop A ke Laptop B

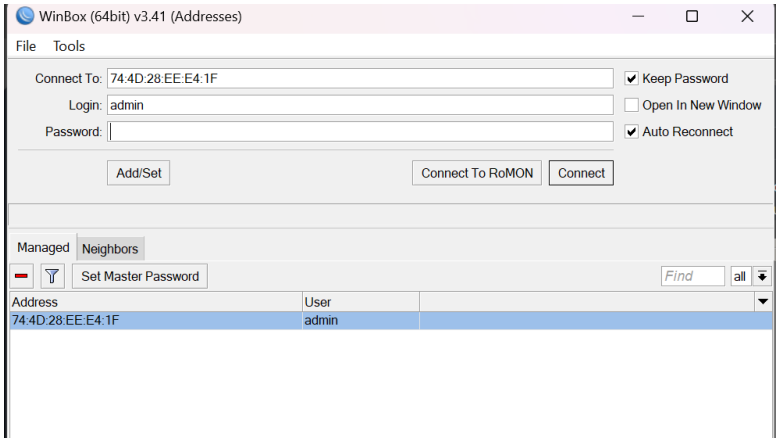


1.3 Routing Dinamis IPv6

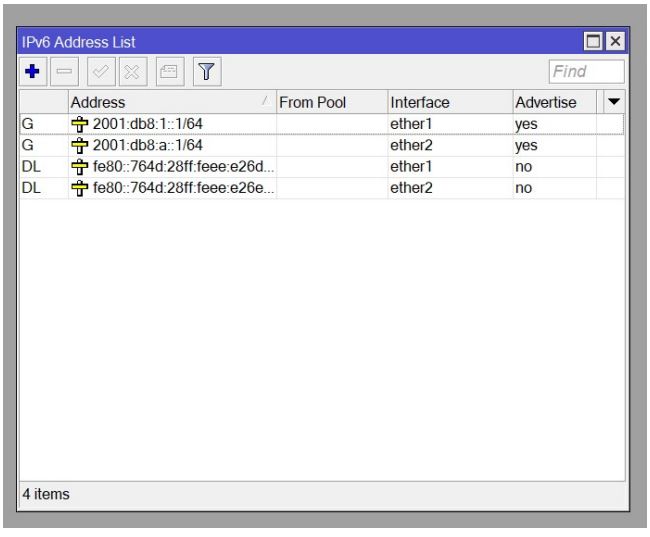
1. Reset Router melalui Winbox pada menu System -> Reset Configuration



2. Login ke router melalui Winbox dalam keadaan tidak ada password kemudian klik "connect"



3. Gunakan IP Address yang Sama Seperti Routing Statis

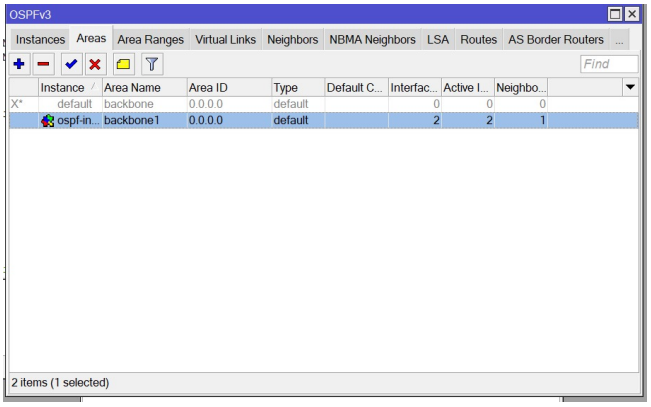


4. Buat OSPFv3 Instance

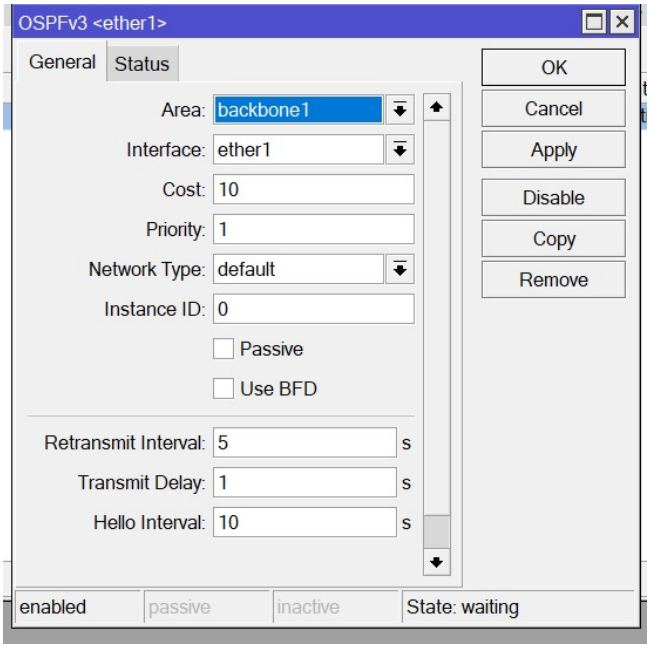
   - Masuk ke menu `IPv6 → Routing → OSPFv3 → Instances`

- Klik +, isi:
  - Name: `ospf-instance`
  - Router ID: `1.1.1.1` (Router A), `2.2.2.2` (Router B)

5. Tambahkan Area OSPF
   - Masuk ke `OSPFv3 → Areas`, klik +
   - Name: `backbone`, Area ID: `0.0.0.0`, Instance: `ospf-instance`

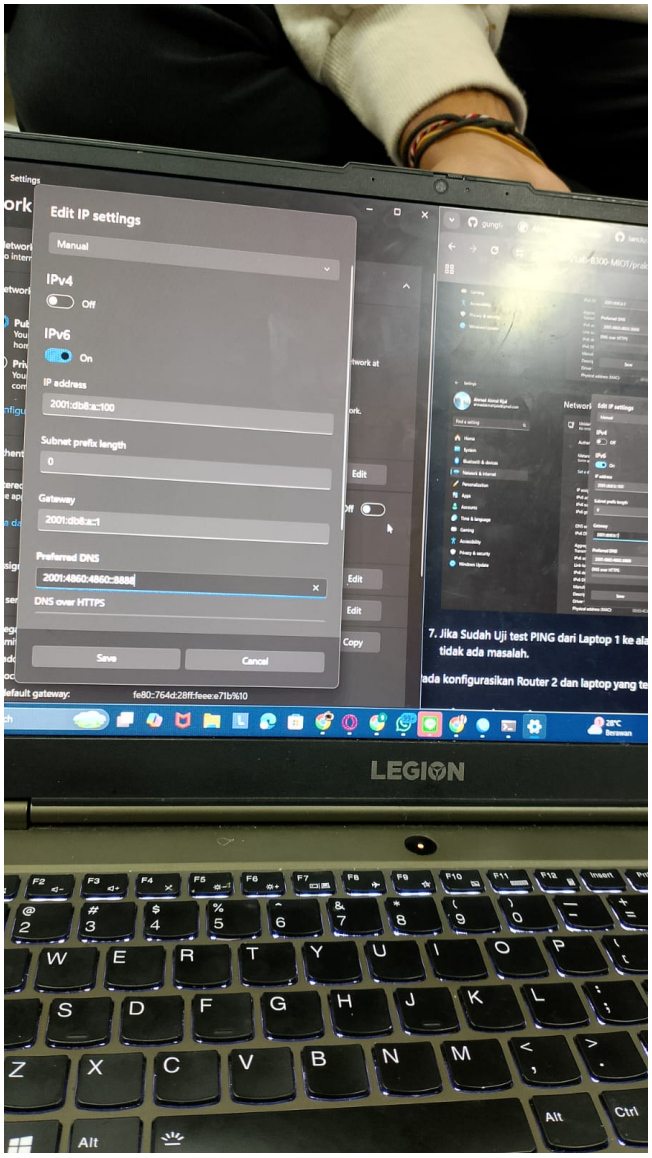


6. Tambahkan Interface ke OSPF
   - Tambahkan `ether1` dan `ether2` pada masing-masing router
   - Assign ke Area `backbone` dan Instance `ospf-instance`



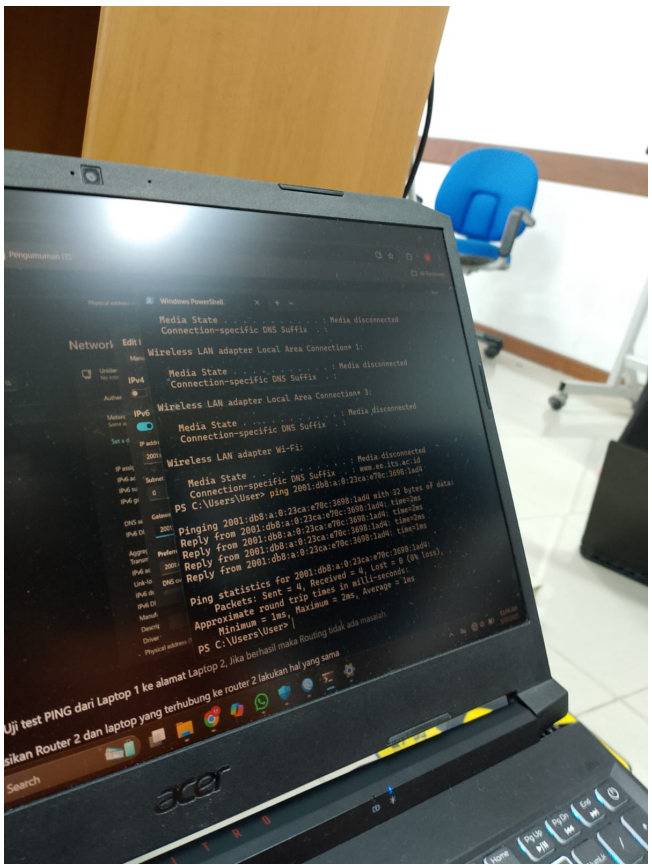
7. Cek Neighbor dan Route Dinamis
   - Menu `OSPFv3 → Neighbors`: pastikan tetangga terdeteksi
   - Menu `IPv6 → Routes`: rute dinamis harus muncul

8. Set IP Static di Laptop (sama seperti routing statis)



9. Uji Koneksi

    - Ping dari Router A ke `2001:db8:b::1`
    - Ping dari Laptop A ke Laptop B

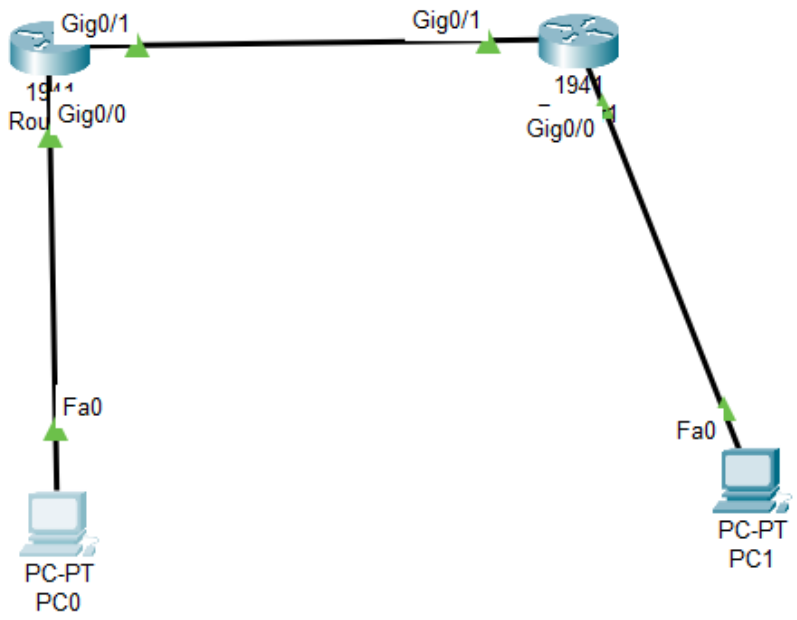


2 Analisis Hasil Percobaan

Pada praktikum ini, dilakukan konfigurasi routing statis dan dinamis menggunakan alamat IPv6 pada dua router yang terhubung dalam sebuah jaringan. Berdasarkan hasil yang diperoleh, konfigurasi routing statis berjalan sesuai dengan teori, di mana setiap router secara manual diberikan rute menuju jaringan tujuan dengan gateway tertentu. Setelah konfigurasi IP antar-router dan jaringan LAN berhasil dilakukan, serta routing statis ditambahkan, pengujian konektivitas menggunakan perintah ping menunjukkan hasil yang berhasil, baik antar-router maupun antar-laptop. Hal ini membuktikan bahwa routing statis IPv6 berfungsi sebagaimana mestinya saat dikonfigurasi dengan benar. Pada bagian routing dinamis, protokol OSPFv3 digunakan untuk mendeteksi jalur secara otomatis. Setelah instance, area, dan interface dikonfigurasi dengan benar pada masing-masing router, rute dinamis langsung muncul dalam tabel routing, dan koneksi berhasil terjalin tanpa perlu penambahan rute manual. Hal ini sesuai dengan teori bahwa OSPFv3 mampu menyederhanakan manajemen routing, khususnya dalam jaringan besar atau dinamis. Meskipun demikian, keberhasilan konfigurasi sangat bergantung pada ketelitian dalam memasukkan alamat IPv6 yang panjang dan kompleks. Selain itu, kesalahan kecil seperti salah konfigurasi gateway laptop ataupun lupa mematikan firewall dapat menyebabkan kegagalan koneksi (gagal menge-ping).

3 Hasil Tugas Modul

1. **Simulasikan Konfigurasi Praktikum P2 di atas mengenai Routing Dinamis dan Statis IPV6 menggunakan GNS3**



Gambar 1: Hasil Simulasi Cisco

3.1 Static

```
^C
C:\>ping 2001:DB8:a::1

Pinging 2001:DB8:a::1 with 32 bytes of data:

Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=255

Ping statistics for 2001:DB8:A::1:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

Control-C
^C
C:\>ping 2001:DB8:b::1

Pinging 2001:DB8:b::1 with 32 bytes of data:

Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=254

Ping statistics for 2001:DB8:B::1:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

Control-C
^C
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 = 0ms, Average = 0ms
```

Gambar 2: Hasil Ping PC0

```
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=4ms 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:\>ping 2001:DB8:b::1

Pinging 2001:DB8:b::1 with 32 bytes of data:

Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:B::1: bytes=32 time=7ms TTL=255

Ping statistics for 2001:DB8:B::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 1ms

C:\>ping 2001:DB8:a::1

Pinging 2001:DB8:a::1 with 32 bytes of data:

Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=254

Ping statistics for 2001:DB8:A::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 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<1ms TTL=126

Ping statistics for 2001:DB8:A::100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
```

Gambar 3: Hasil Ping PC1

```
Router#ping 2001:DB8:a::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:a::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/6/10 ms

Router#ping 2001:DB8:a::100

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:a::100, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/2/11 ms

Router#ping 2001:DB8:b::100

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:b::100, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router#ping 2001:DB8:b::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:b::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Gambar 4: Hasil Ping Router 0

```
Router#ping 2001:DB8:b::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:b::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/8/12 ms

Router#ping 2001:DB8:b::100

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:b::100, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router#ping 2001:DB8:a::100

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:a::100, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms

Router#ping 2001:DB8:a::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:a::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Gambar 5: Hasil Ping Router 1

3.2 Dinamis

```
C:\>ping 2001:DB8:b::1

Pinging 2001:DB8:b::1 with 32 bytes of data:

Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:B::1: bytes=32 time=4ms TTL=254
Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=254

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

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=9ms TTL=128
Reply from 2001:DB8:A::100: bytes=32 time=7ms TTL=128
Reply from 2001:DB8:A::100: bytes=32 time=7ms TTL=128
Reply from 2001:DB8:A::100: bytes=32 time=4ms TTL=128

Ping statistics for 2001:DB8:A::100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 9ms, Average = 6ms

C:\>ping 2001:DB8:a::1

Pinging 2001:DB8:a::1 with 32 bytes of data:

Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=255

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

Gambar 6: Hasil Ping PC0

```
Pinging 2001:DB8:a::1 with 32 bytes of data:

Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=254
Reply from 2001:DB8:A::1: bytes=32 time<1ms TTL=254

Ping statistics for 2001:DB8:A::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 2001:DB8:b::1

Pinging 2001:DB8:b::1 with 32 bytes of data:

Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=255
Reply from 2001:DB8:B::1: bytes=32 time<1ms TTL=255

Ping statistics for 2001:DB8:B::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 2001:DB8:b::100

Pinging 2001:DB8:b::100 with 32 bytes of data:

Reply from 2001:DB8:B::100: bytes=32 time=8ms TTL=128
Reply from 2001:DB8:B::100: bytes=32 time=6ms TTL=128
Reply from 2001:DB8:B::100: bytes=32 time=23ms 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 = 23ms, Average = 9ms
```

Gambar 7: Hasil Ping PC1

```
Router#ping 2001:db8:b::100

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:b::100, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms

Router#ping 2001:db8:b::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:b::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Router#ping 2001:db8:a::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:a::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 7/9/14 ms

Router#ping 2001:db8:a::100

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:a::100, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

Gambar 8: Hasil Ping Router 0

```
Router#ping 2001:db8:a::100

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:a::100, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms

Router#ping 2001:db8:b::100

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:b::100, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms

Router#ping 2001:db8:b::1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:db8:b::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/7/13 ms
```

Gambar 9: Hasil Ping Router 1

4 Kesimpulan

Praktikum routing IPv6 secara statis dan dinamis ini memiliki step yang hampir sama dengan praktikum routing IPv4 sebelumnya dimana routing IPv6 ini ditekankan tujuannya untuk memberikan pemahaman kepada praktikan mengenai cara kerja pengaturan jalur data antarjaringan menggunakan protokol IPv6. Berdasarkan hasil yang diperoleh, konfigurasi routing statis berhasil dilakukan dengan menambahkan rute secara manual pada masing-masing router sedangkan routing dinamis menggunakan OSPFv3 memungkinkan pertukaran informasi routing secara otomatis. Dari praktikum ini, praktikan dapat memahami perbedaan antara routing statis yang bersifat manual dan routing dinamis yang lebih fleksibel dan otomatis. Selain itu, praktikum ini juga menekankan pentingnya ketelitian dalam pengisian parameter jaringan, serta kerja dari protokol routing dinamis dalam mengelola jaringan.

5 Lampiran

5.1 Dokumentasi saat praktikum

Gambar 10: Dokumentasi Telah Melakukan Praktikum