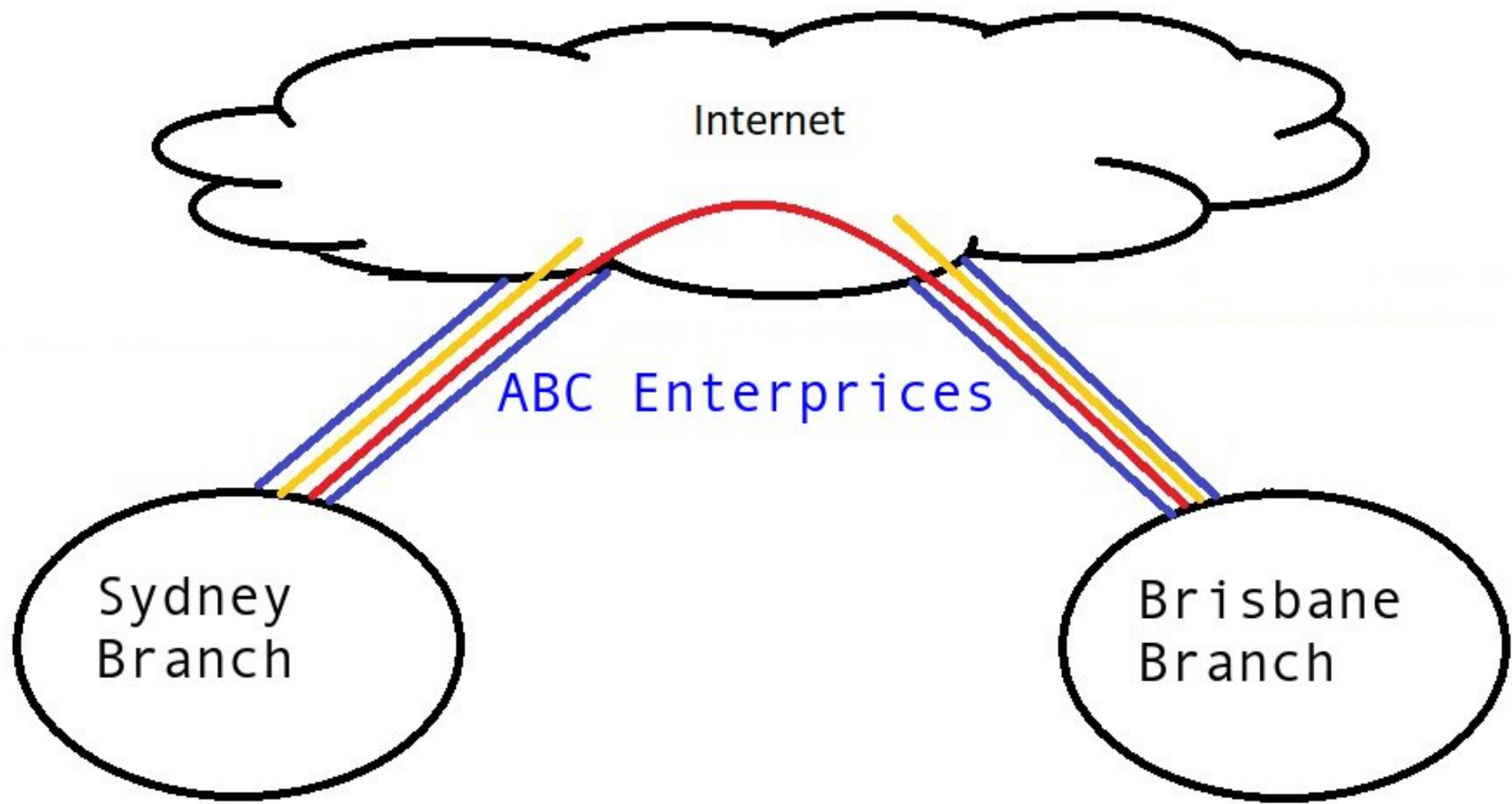


ICTNWK541

Assessment

Assessment Task 2: Project Portfolio

Manuel Sergio Perez Espitia

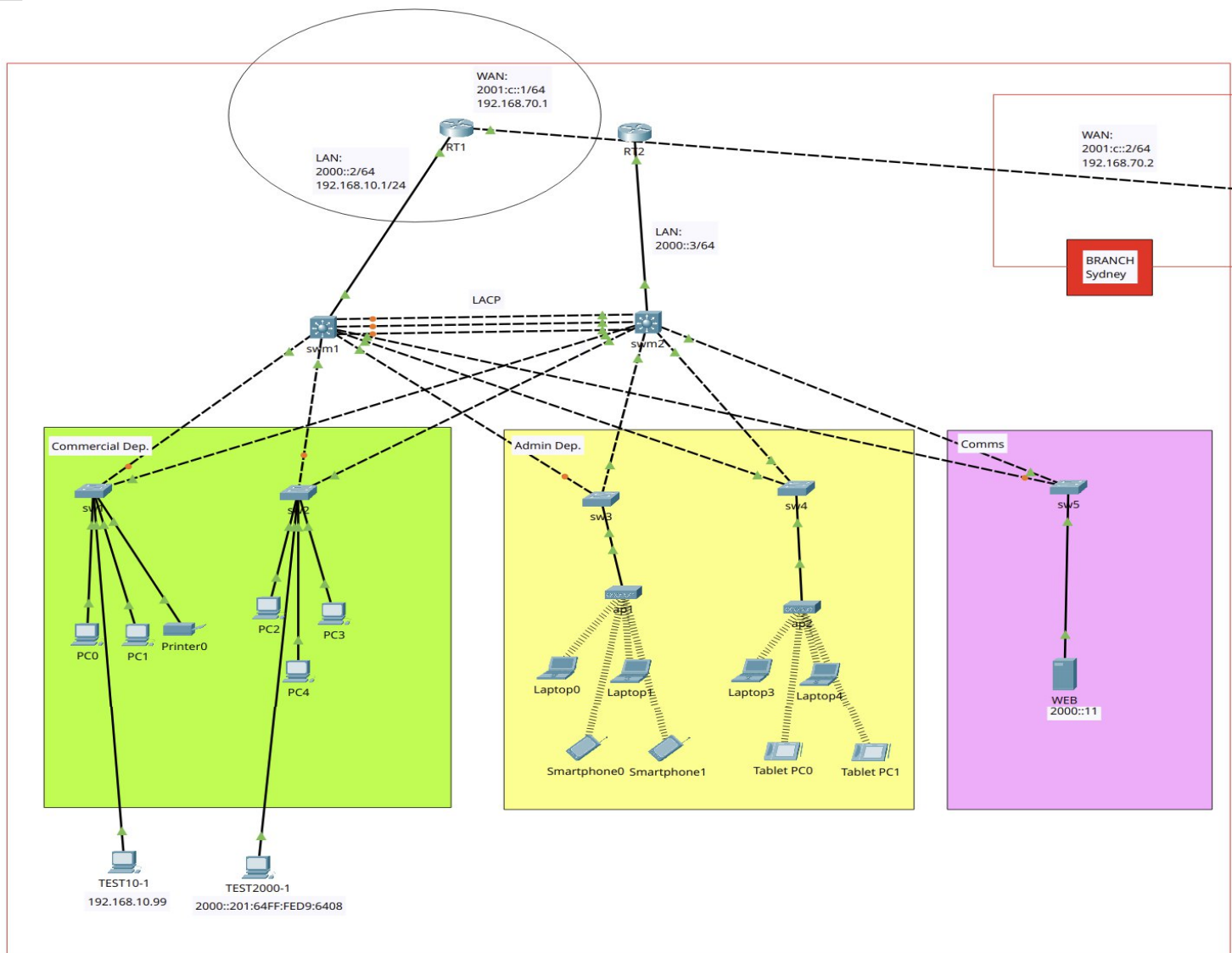
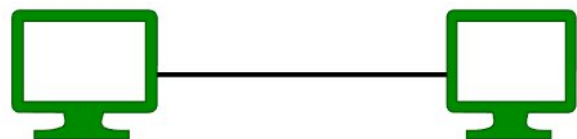


We are the network engineer responsible for implementing the required WAN connectivity for ABC Enterprises.

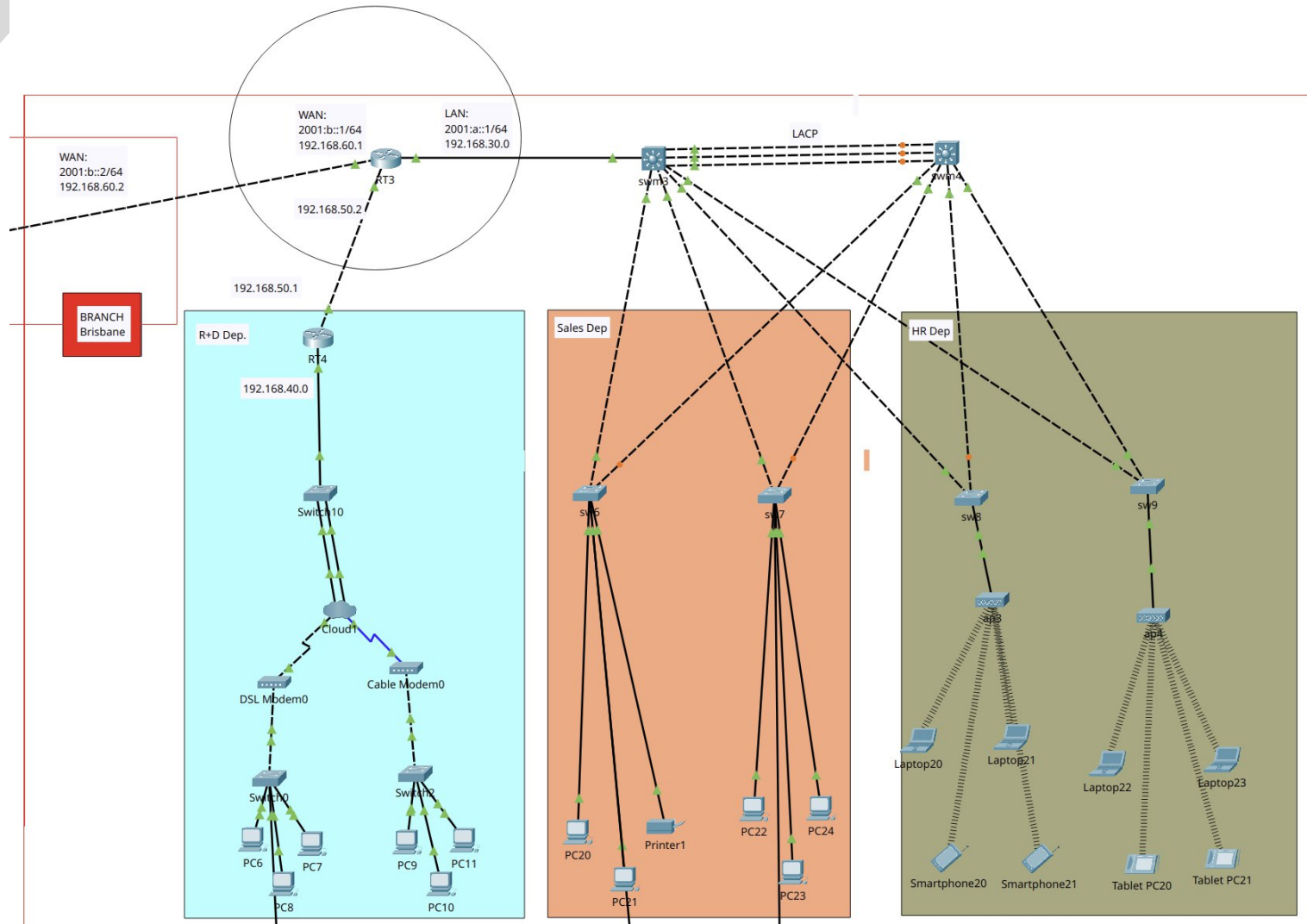
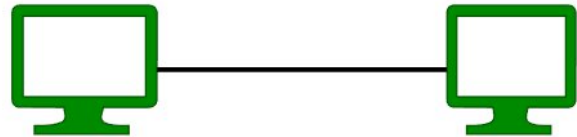


ABC Enterprises wants to improve its network due to old infrastructure, security and reliability WAN connectivity between Sydney Branch and Brisbane Branch.

Sydney Branch



Brisbane Branch



Simulation Software & Tools

- Cisco Packet Tracer 8.2.2
- Ubuntu 24.04 LTS
- Wireshark 4.2.2





Network Details

Sydney Branch

Type: LAN/WAN

Topology: Dual-Star high
availability

Architecture: 3-Tier

Brisbane Branch:

Type: LAN/WAN

Topology: Dual-Star high
availability

Architecture: 2-Tier

Network Nodes

Sydney		Brisbane
2 (HA)	Routers	2
5	Switches	5
2 (HA)	Switches L3	2 (HA)
1x1x0	Servers, Printers, Modems	0x1x2
13	End Devices	19

Content

- Legal & security: Policies and Procedures
- WAN Configuration and Troubleshooting & Testing
- Summary Technologies & Protocols





Legal & security: Policies and Procedures

Legal & security

ABC Enterprises adopts security technologies to ensure data protection. The company's policies are outlined below.



Legal & security

Service Password Encryption

Policy to prevent access to plain-text passwords in network devices.



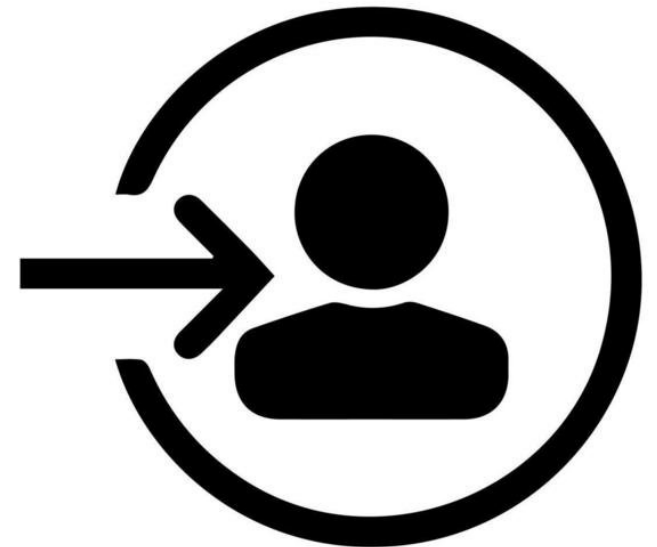
ISO/IEC 27001

Legal & security

Mandatory Login Password

Policy on all network devices that requires a login password for any access to routers or switches.

NIST SP 800-53 (IA-2)



Legal & security

VPN Site-to-Site

Policy implements IPSec to protect data in transit between different company branches over internet.

NIST SP 800-77



Legal & security

Access Control Lists (ACLs)

Policy to filter traffic and control access between subnets, enhance internal network security.

ISO/IEC 27002 (s13)



Legal & security

Secure Remote Access to infrastructure

Policy to protect remote access by Telnet and SSH to network devices using password-protected and encrypted.

NIST SP 800-5

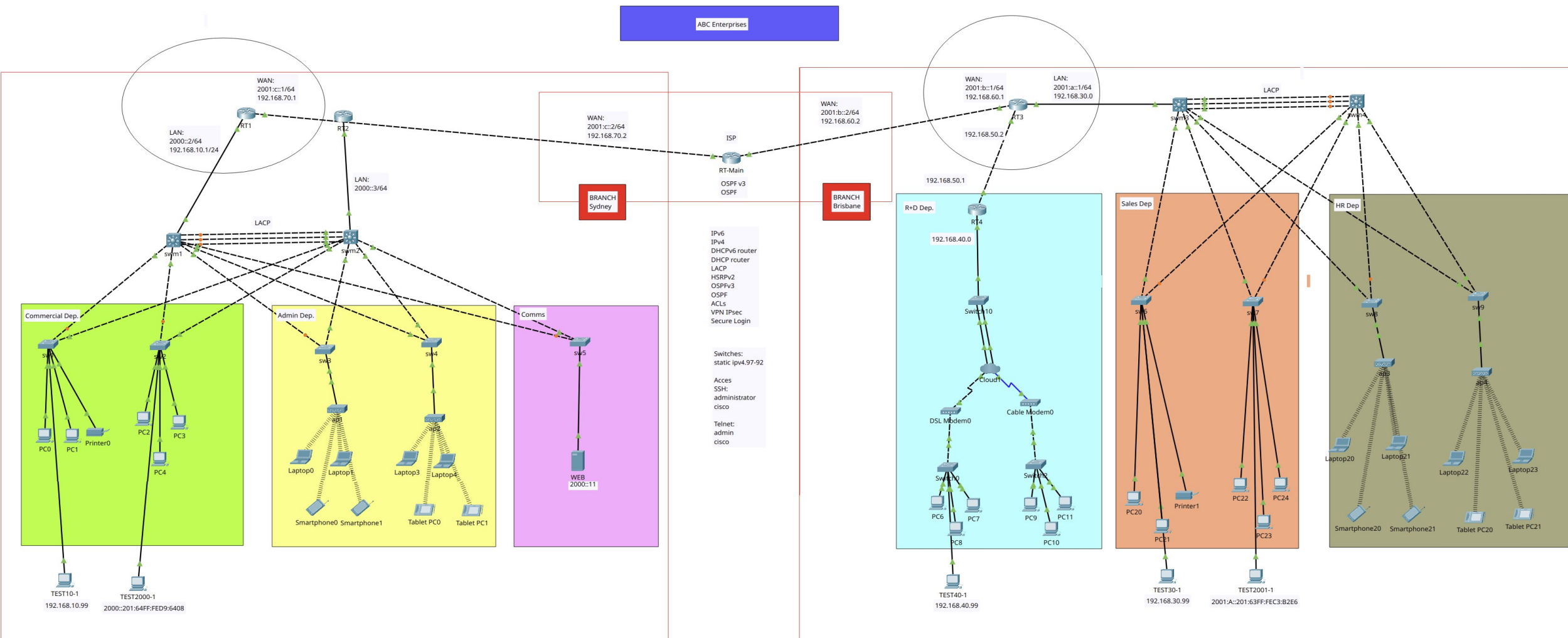


The left side of the slide features several abstract, overlapping gray shapes. These shapes are irregular and organic, resembling stylized rocks or fluid forms. They are positioned on the left side, with some extending towards the center, creating a layered, three-dimensional effect against the white background.

WAN Configuration

Installation Plan

Network



WAN Configuration

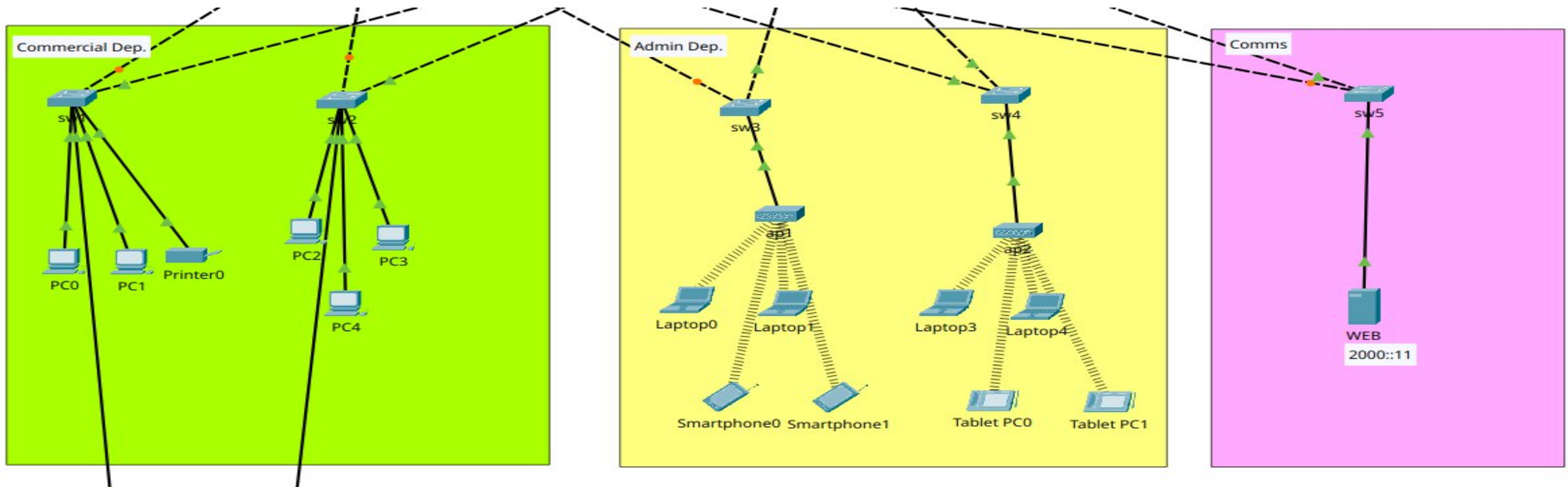
- Secure Access by SSH & Telnet
- Additional Protocols: DHCP
- Additional Protocols: LACP
- Additional Protocols: HSRP
- Additional Protocols: OSPF
- WAN protocols: ACL
- WAN Protocols: VPN
- WAN Protocols: PPP
- Dynamic NAT
- Firewall Single-port
- Logging Network



Troubleshooting & Testing

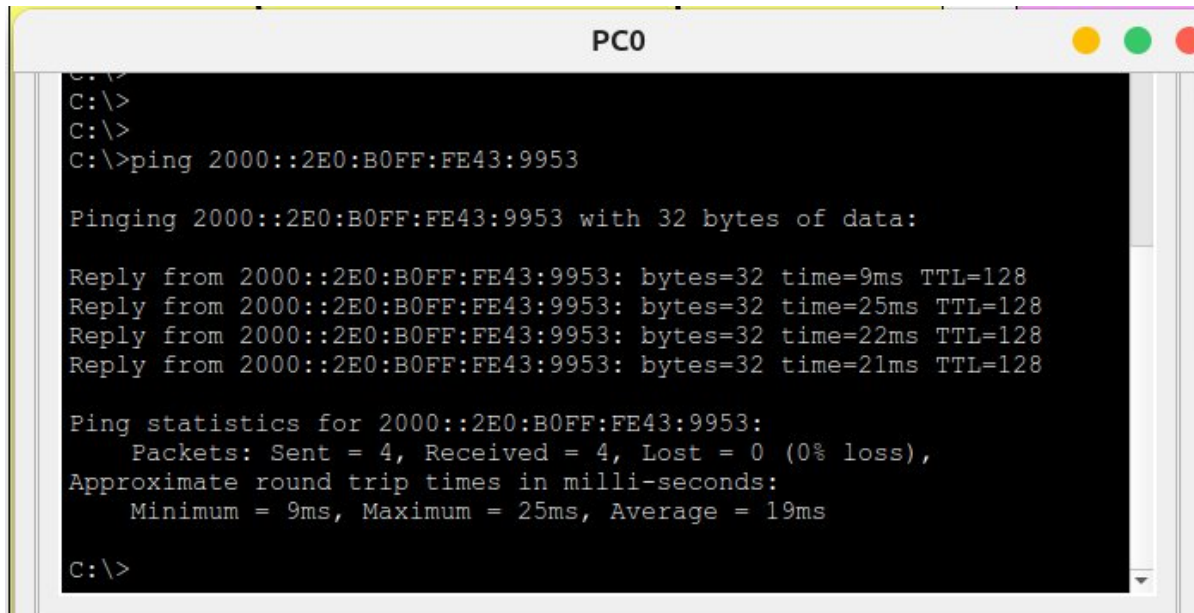
Local

Sydney Branch



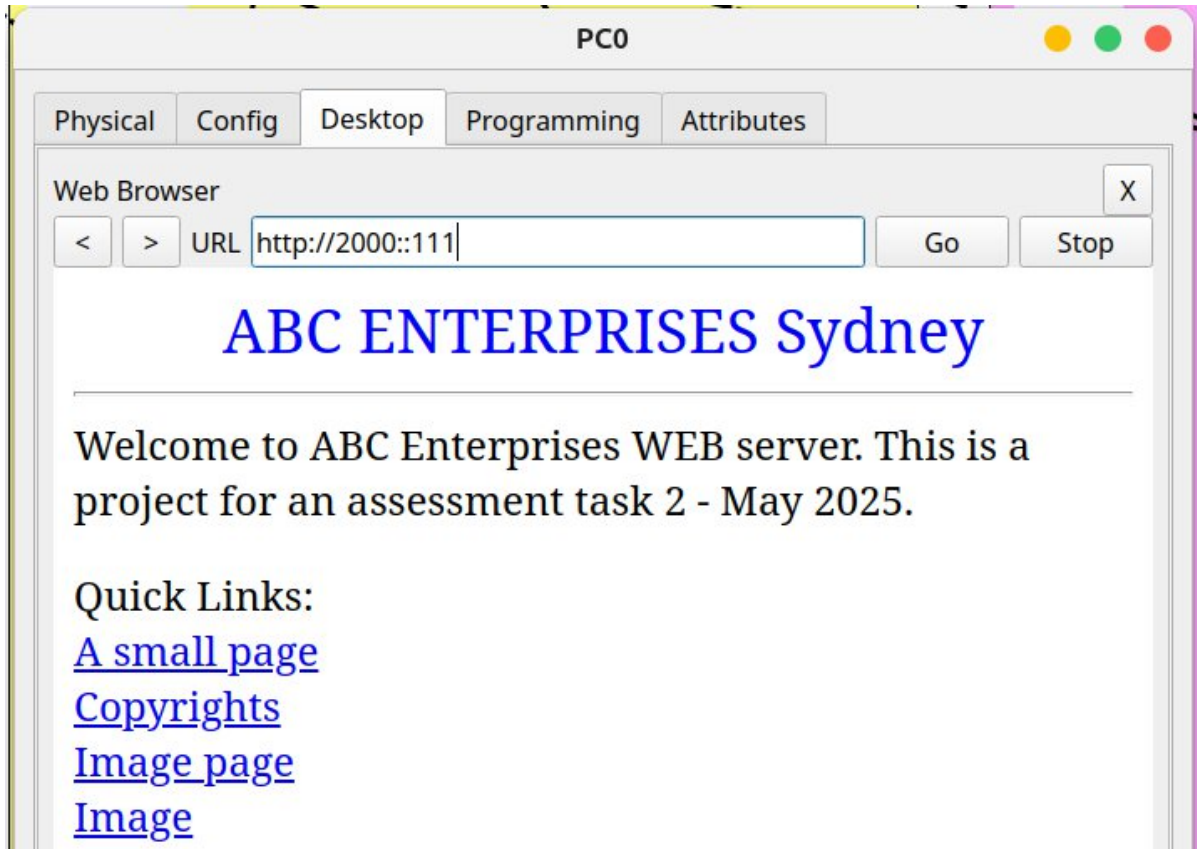
Sydney Branch - Local

Commercial and Admin
over IPv6PC0 LAPTOP0



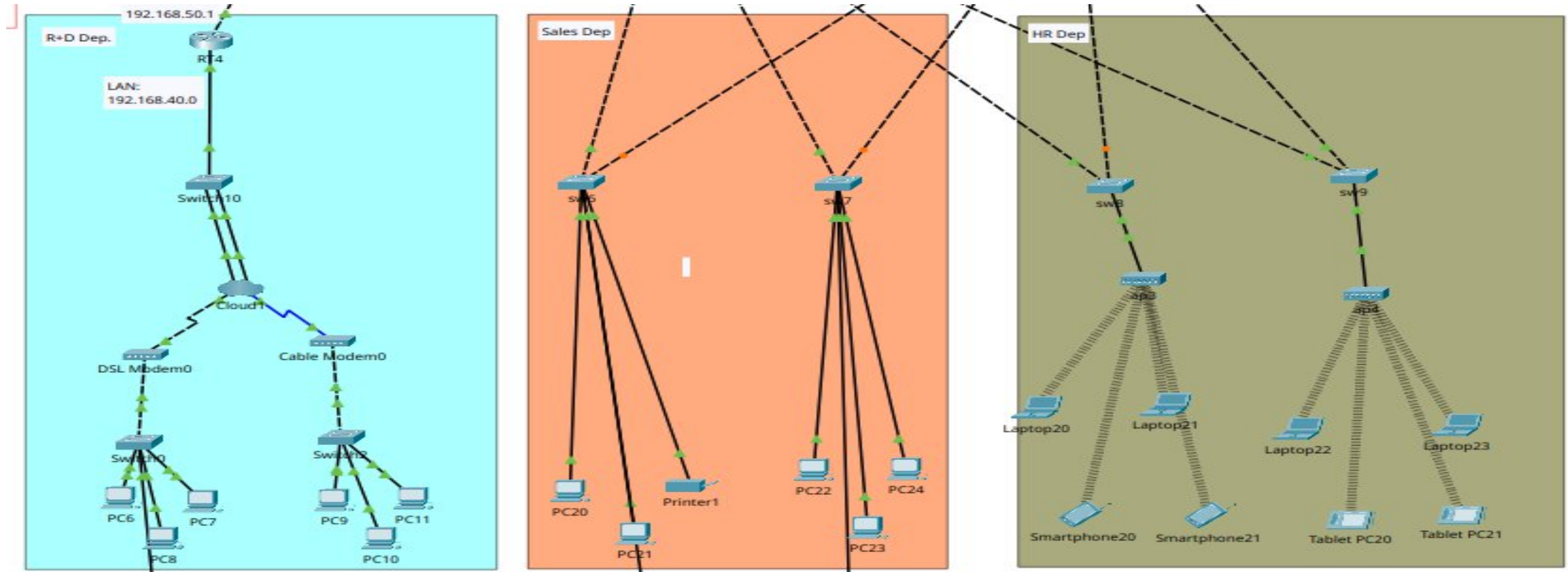
```
C:\>  
C:\>  
C:\>  
C:\>ping 2000::2E0:B0FF:FE43:9953  
  
Pinging 2000::2E0:B0FF:FE43:9953 with 32 bytes of data:  
  
Reply from 2000::2E0:B0FF:FE43:9953: bytes=32 time=9ms TTL=128  
Reply from 2000::2E0:B0FF:FE43:9953: bytes=32 time=25ms TTL=128  
Reply from 2000::2E0:B0FF:FE43:9953: bytes=32 time=22ms TTL=128  
Reply from 2000::2E0:B0FF:FE43:9953: bytes=32 time=21ms TTL=128  
  
Ping statistics for 2000::2E0:B0FF:FE43:9953:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 9ms, Maximum = 25ms, Average = 19ms  
  
C:\>
```

Sydney Branch - Local

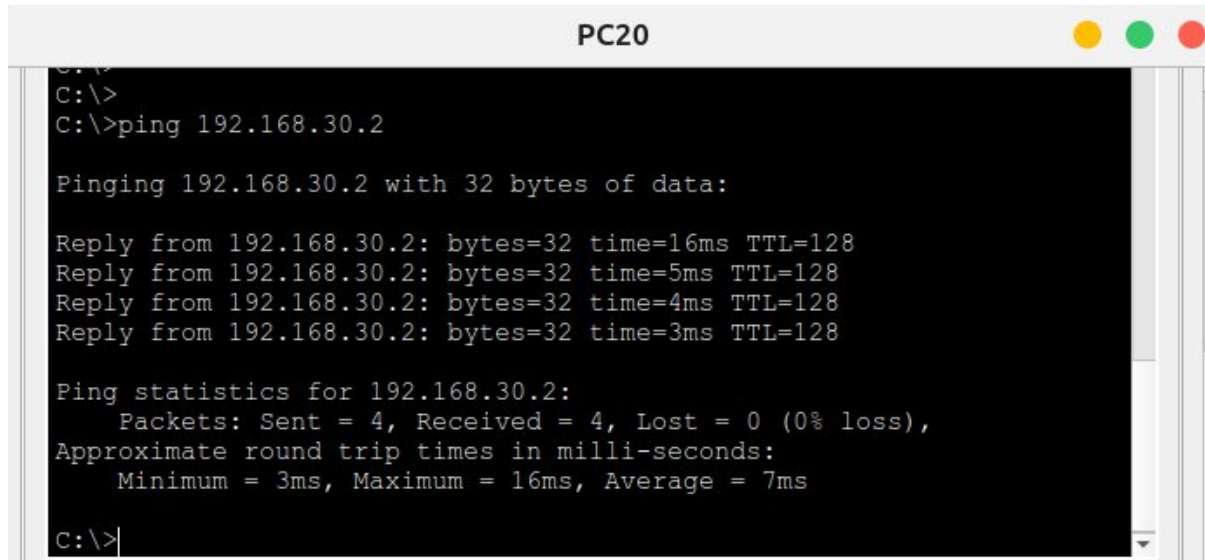


Commercial and Comms
over IPv6
WEB PC0

Brisbane Branch



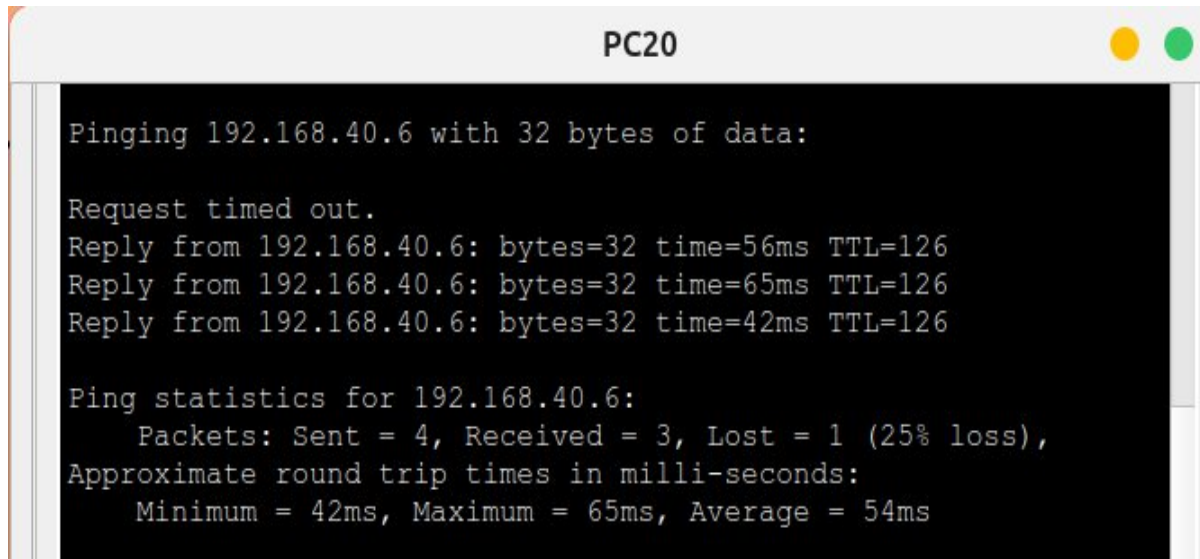
Brisbane Branch - Local



```
C:\>  
C:\>  
C:\>ping 192.168.30.2  
  
Pinging 192.168.30.2 with 32 bytes of data:  
  
Reply from 192.168.30.2: bytes=32 time=16ms TTL=128  
Reply from 192.168.30.2: bytes=32 time=5ms TTL=128  
Reply from 192.168.30.2: bytes=32 time=4ms TTL=128  
Reply from 192.168.30.2: bytes=32 time=3ms TTL=128  
  
Ping statistics for 192.168.30.2:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 3ms, Maximum = 16ms, Average = 7ms  
  
C:\>
```

Sales and HR over IPv4
PC20 LAPTOP20

Brisbane Branch - Local



```
PC20

Pinging 192.168.40.6 with 32 bytes of data:

Request timed out.
Reply from 192.168.40.6: bytes=32 time=56ms TTL=126
Reply from 192.168.40.6: bytes=32 time=65ms TTL=126
Reply from 192.168.40.6: bytes=32 time=42ms TTL=126

Ping statistics for 192.168.40.6:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 42ms, Maximum = 65ms, Average = 54ms
```

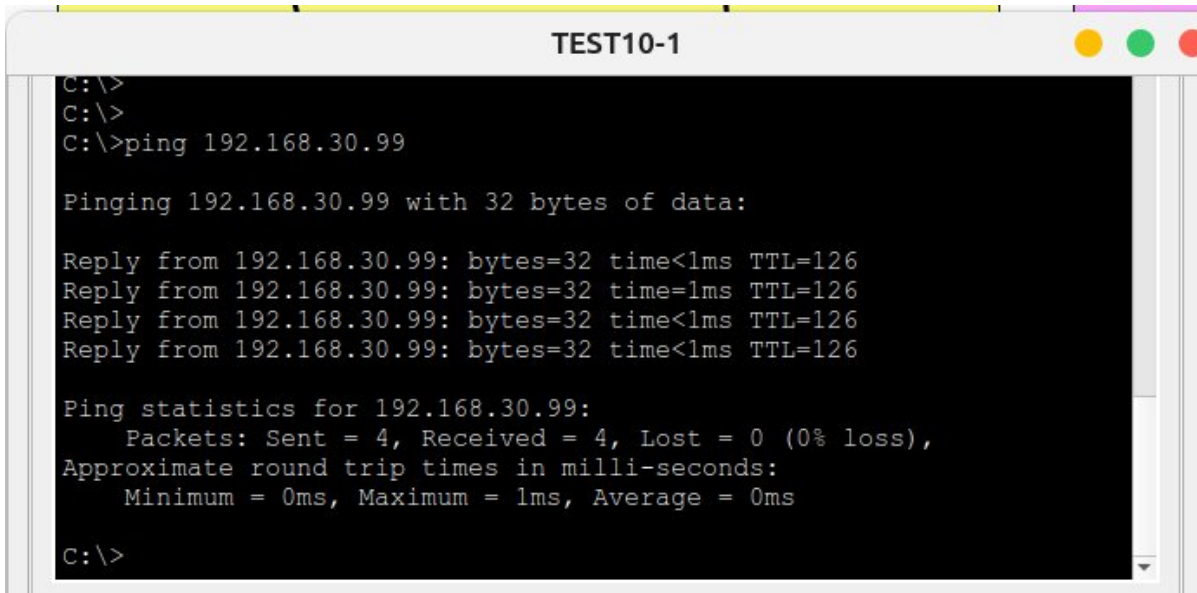
Sales and R+D
HR and R+D over IPv4



Troubleshooting & Testing

WAN

WAN

A screenshot of a Windows command prompt window titled "TEST10-1". The window has a black background and white text. The command prompt shows the user at the C:\> prompt, typing "ping 192.168.30.99". The output shows four successful replies from 192.168.30.99, each with 32 bytes, a time of less than 1ms, and a TTL of 126. Below the replies, the ping statistics are displayed, showing 4 packets sent, 4 received, 0 lost (0% loss), and approximate round trip times of 0ms minimum, 1ms maximum, and 0ms average. The prompt returns to C:\>.

```
TEST10-1
C:\>
C:\>
C:\>ping 192.168.30.99

Pinging 192.168.30.99 with 32 bytes of data:

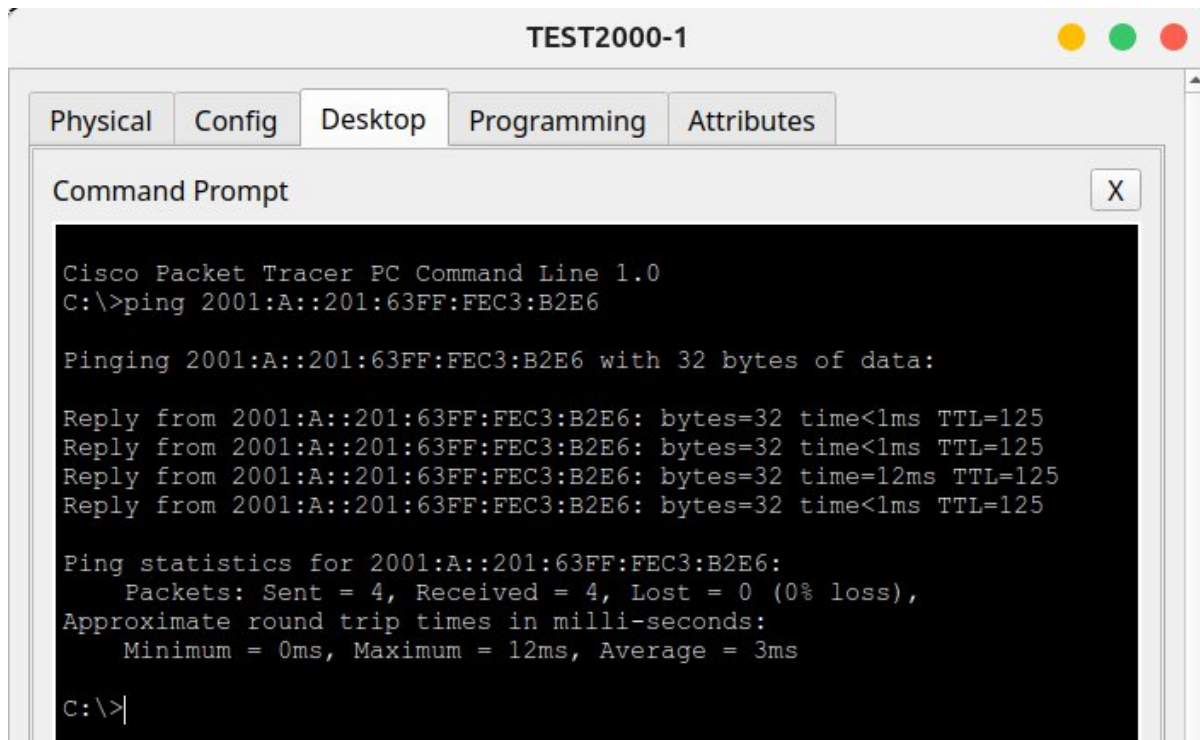
Reply from 192.168.30.99: bytes=32 time<1ms TTL=126
Reply from 192.168.30.99: bytes=32 time=1ms TTL=126
Reply from 192.168.30.99: bytes=32 time<1ms TTL=126
Reply from 192.168.30.99: bytes=32 time<1ms TTL=126

Ping statistics for 192.168.30.99:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

Sydney Branch and Brisbane Branch over IPv4

WAN



The screenshot shows a window titled "TEST2000-1" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The command prompt shows the execution of a ping command to the IPv6 address 2001:A::201:63FF:FEC3:B2E6. The output indicates that the ping was successful, with 4 packets sent and received, 0% loss, and round trip times ranging from 0ms to 12ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 2001:A::201:63FF:FEC3:B2E6

Pinging 2001:A::201:63FF:FEC3:B2E6 with 32 bytes of data:

Reply from 2001:A::201:63FF:FEC3:B2E6: bytes=32 time<1ms TTL=125
Reply from 2001:A::201:63FF:FEC3:B2E6: bytes=32 time<1ms TTL=125
Reply from 2001:A::201:63FF:FEC3:B2E6: bytes=32 time=12ms TTL=125
Reply from 2001:A::201:63FF:FEC3:B2E6: bytes=32 time<1ms TTL=125

Ping statistics for 2001:A::201:63FF:FEC3:B2E6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 12ms, Average = 3ms

C:\>|
```

Brisbane Branch and Sydney Branch over IPv6



Secure Access SSH & Telnet

WAN

Secure Access

```
PC0
C:\>
C:\>
C:\>ssh -l administrator 192.168.10.1

Password: |
```

```
PC0
C:\>
C:\>telnet 192.168.10.1
Trying 192.168.10.1 ...Open

|
User Access Verification

Password:
```

```
RT1
RT1>
RT1>
RT1>en
RT1>enable
Password: |
```

Copy Paste

RT1

192.168.10.1

Secure Access

```
PC0
C:\>
C:\>
C:\>
C:\>ssh -l administrator 2000::3

Password:
```

☐ Top

```
PC0
C:\>
C:\>
C:\>telnet 2000::3
Trying 2000::3 ...Open

User Access Verification

Password:
```

```
RT2
RT2>
RT2>en
RT2>enable
Password: |
```

Copy Paste

RT2

2000::3

Secure Access

sw10

VLAN1:192.168.40.98

PC6

```
C:\>  
C:\>  
C:\>  
C:\>  
C:\>ssh -l administrator 192.168.40.98  
Password: |
```

☐ Top

PC6

```
C:\>telnet 192.168.40.98  
Trying 192.168.40.98 ...Open  
  
User Access Verification  
Password: |
```

☐ Top

Switch10

```
sw10>  
sw10>  
sw10>  
sw10>  
sw10>en  
sw10>enable  
Password:
```

The background of the slide features several large, overlapping, organic shapes in a light grey color. These shapes are positioned primarily on the left and bottom portions of the frame, leaving the right side more open for the text.

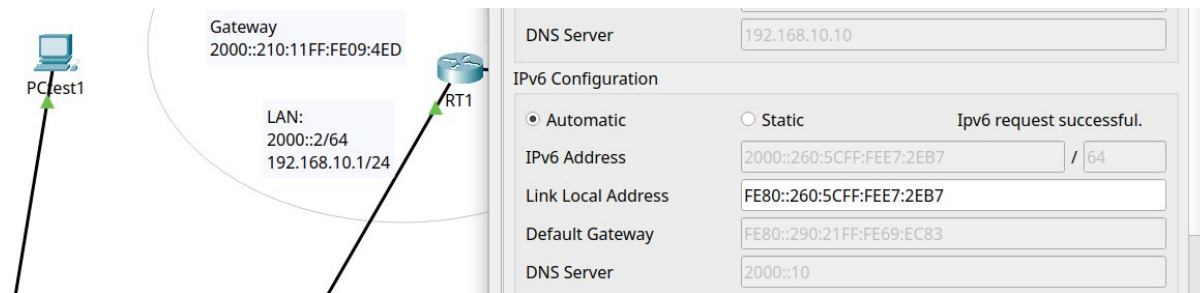
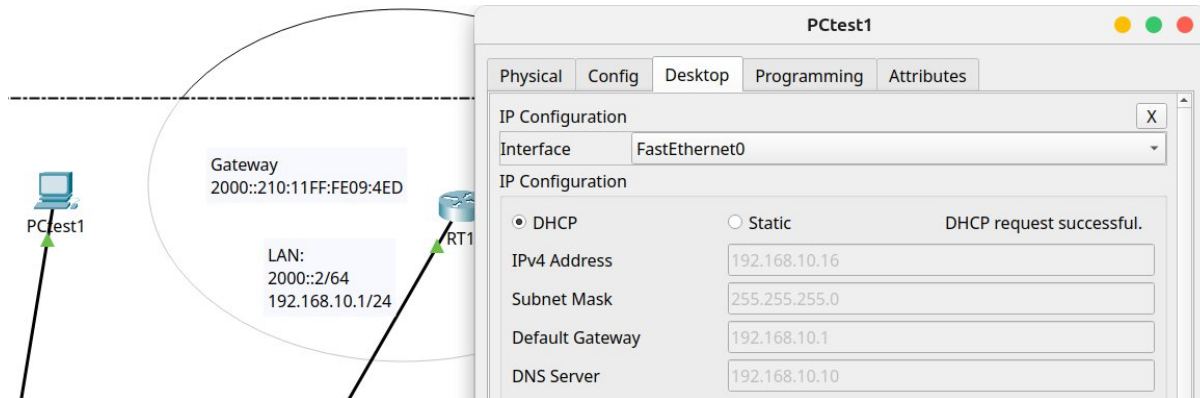
DHCP

WAN

Sydney Branch

RT1

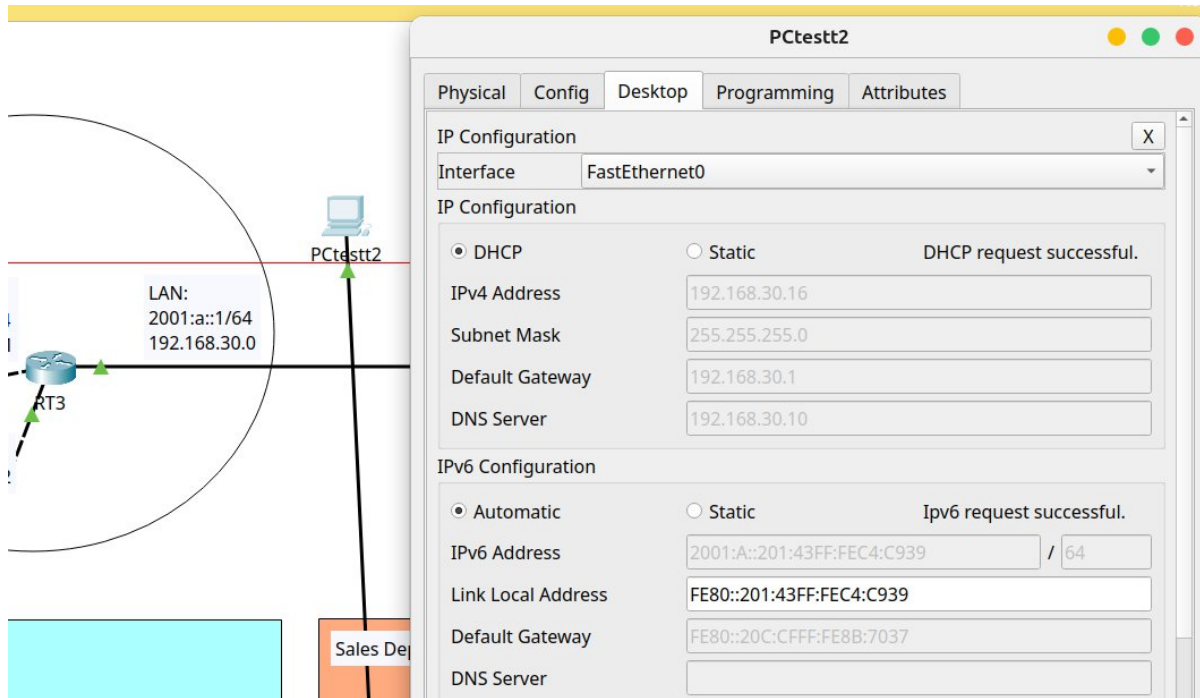
New PC configured to
DHCP and IPv6 Auto



Brisbane Branch

RT3

New PC configured to
DHCP and IPv6 Auto



Testing LACP

WAN – IPv6

Summary port-channel

```
swm1#show et
swm1#show etherchannel su
swm1#show etherchannel summary
Flags: D - down          P - in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        f - failed to allocate aggregator
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

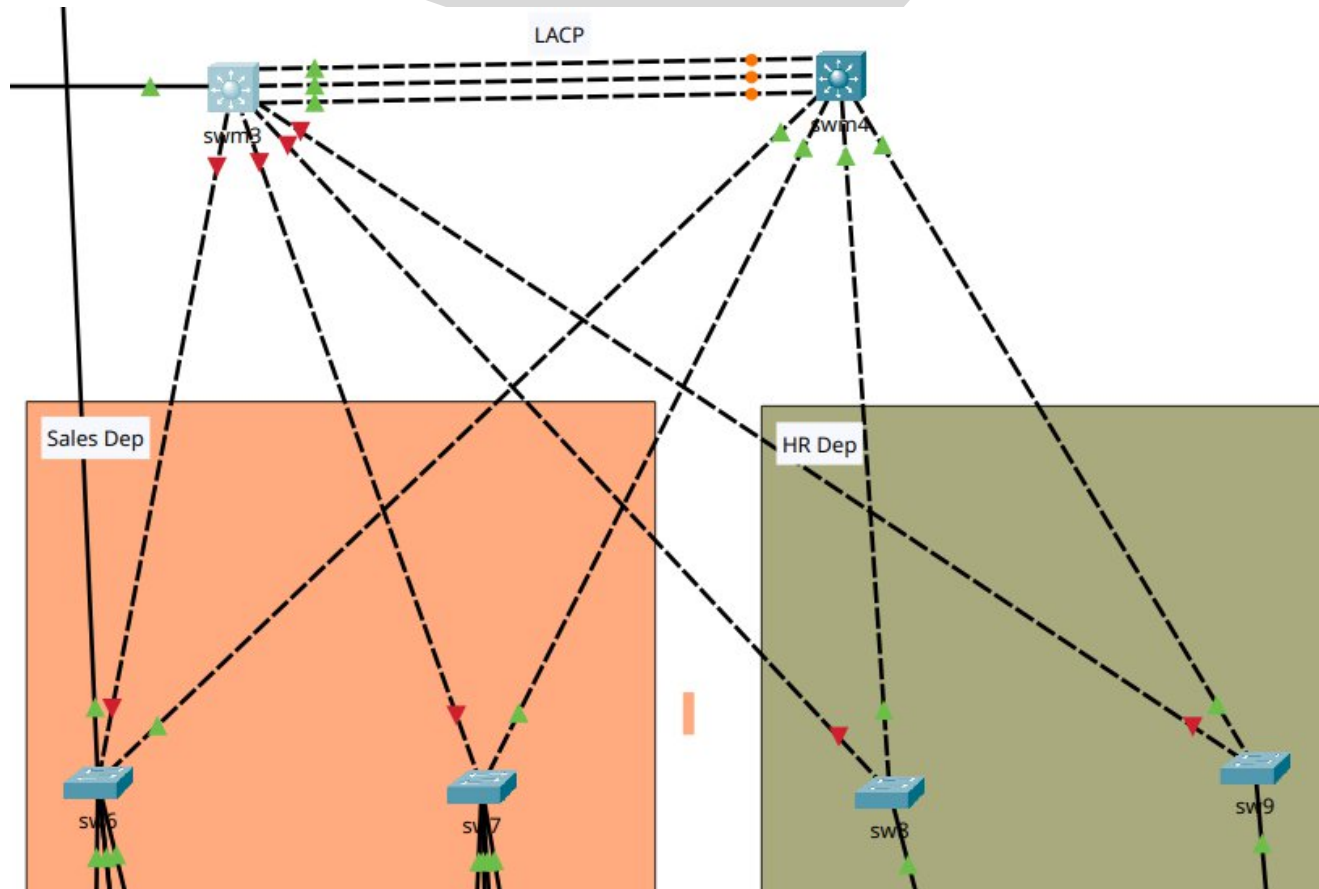
Number of channel-groups in use: 1
Number of aggregators:          1

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
1      Po1 (SU)      LACP       Gig1/0/22(P) Gig1/0/23(P) Gig1/0/24(P)
```

Sydney

Summary config

LACP - Brisbane Branch



- Turned Down swm3 interfaces

Brisbane Branch

```
Laptop20

Pinging 2001:a::99 with 32 bytes of data:

Reply from 2001:A::99: bytes=32 time=34ms TTL=128
Reply from 2001:A::99: bytes=32 time=20ms TTL=128
Reply from 2001:A::99: bytes=32 time=11ms TTL=128
Reply from 2001:A::99: bytes=32 time=16ms TTL=128

Ping statistics for 2001:A::99:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

- Connections are still working...

```
Smartphone20

Pinging 192.168.10.99 with 32 bytes of data:

Request timed out.
Reply from 192.168.10.99: bytes=32 time=20ms TTL=126
Reply from 192.168.10.99: bytes=32 time=34ms TTL=126
Reply from 192.168.10.99: bytes=32 time=22ms TTL=126

Ping statistics for 192.168.10.99:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
```

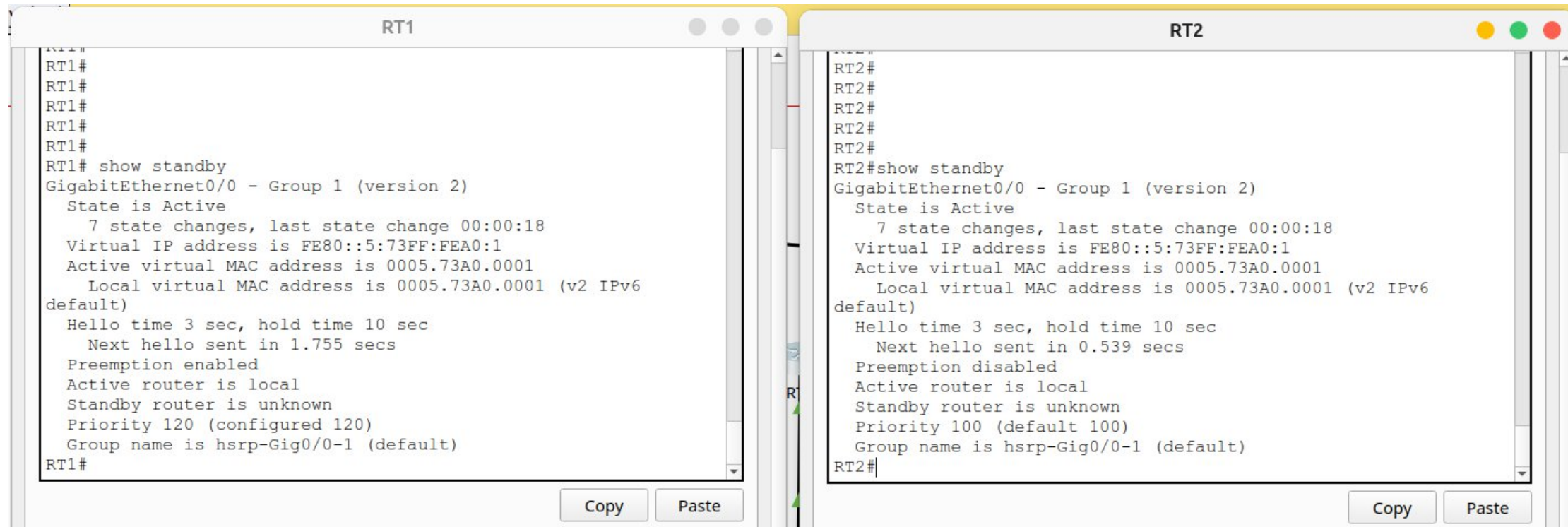

The left side of the slide features several abstract, light grey shapes. These include a long, thin, curved shape at the top, a large, rounded, irregular shape in the middle, and several other smaller, rounded shapes at the bottom, all set against a white background.

Testing HSRP

Sydney – IPv6

HSRP

Primary (priority 120) and secondary router (priority 100).

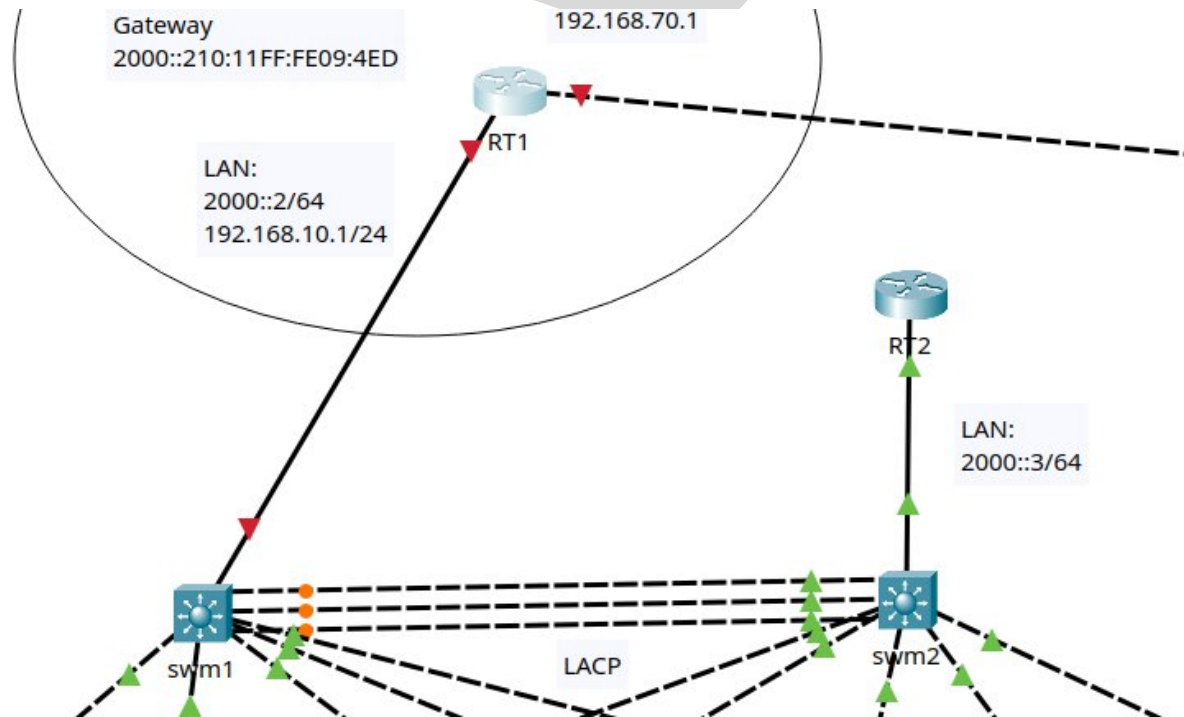


The image displays two terminal windows side-by-side, representing the command-line interfaces of two routers, RT1 and RT2. Both windows show the output of the 'show standby' command for the GigabitEthernet0/0 interface, configured for HSRP Group 1. RT1 is the primary router with a priority of 120, while RT2 is the secondary router with a default priority of 100. Both are in an 'Active' state. The virtual IP address for both is FE80::5:73FF:FEA0:1, and the active virtual MAC address is 0005.73A0.0001. RT1 has a hold time of 10 seconds, while RT2 has a hold time of 0.539 seconds. Both have a group name of 'hsrp-Gig0/0-1'.

```
RT1#  
RT1#  
RT1#  
RT1#  
RT1#  
RT1# show standby  
GigabitEthernet0/0 - Group 1 (version 2)  
  State is Active  
    7 state changes, last state change 00:00:18  
  Virtual IP address is FE80::5:73FF:FEA0:1  
  Active virtual MAC address is 0005.73A0.0001  
  Local virtual MAC address is 0005.73A0.0001 (v2 IPv6  
default)  
  Hello time 3 sec, hold time 10 sec  
    Next hello sent in 1.755 secs  
  Preemption enabled  
  Active router is local  
  Standby router is unknown  
  Priority 120 (configured 120)  
  Group name is hsrp-Gig0/0-1 (default)  
RT1#
```

```
RT2#  
RT2#  
RT2#  
RT2#  
RT2#  
RT2# show standby  
GigabitEthernet0/0 - Group 1 (version 2)  
  State is Active  
    7 state changes, last state change 00:00:18  
  Virtual IP address is FE80::5:73FF:FEA0:1  
  Active virtual MAC address is 0005.73A0.0001  
  Local virtual MAC address is 0005.73A0.0001 (v2 IPv6  
default)  
  Hello time 3 sec, hold time 10 sec  
    Next hello sent in 0.539 secs  
  Preemption disabled  
  Active router is local  
  Standby router is unknown  
  Priority 100 (default 100)  
  Group name is hsrp-Gig0/0-1 (default)  
RT2#
```

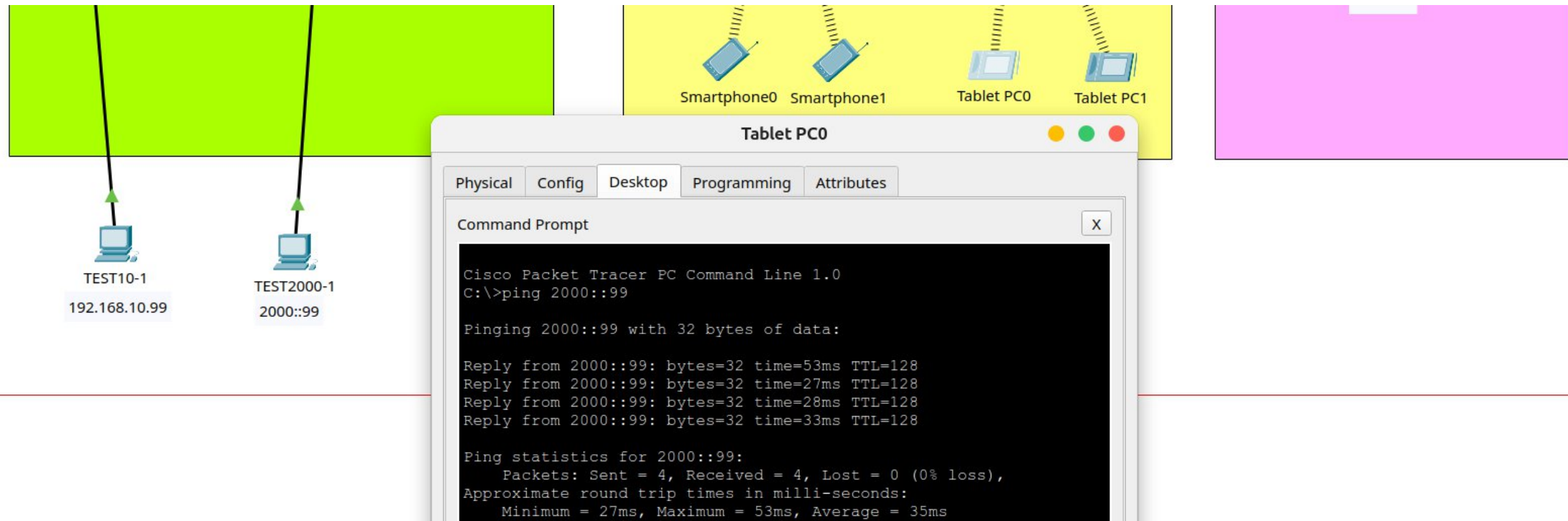
HSRP



The primary router will be turned off to verify network behaviour.

HSRP

RT2 keeps LAN working...

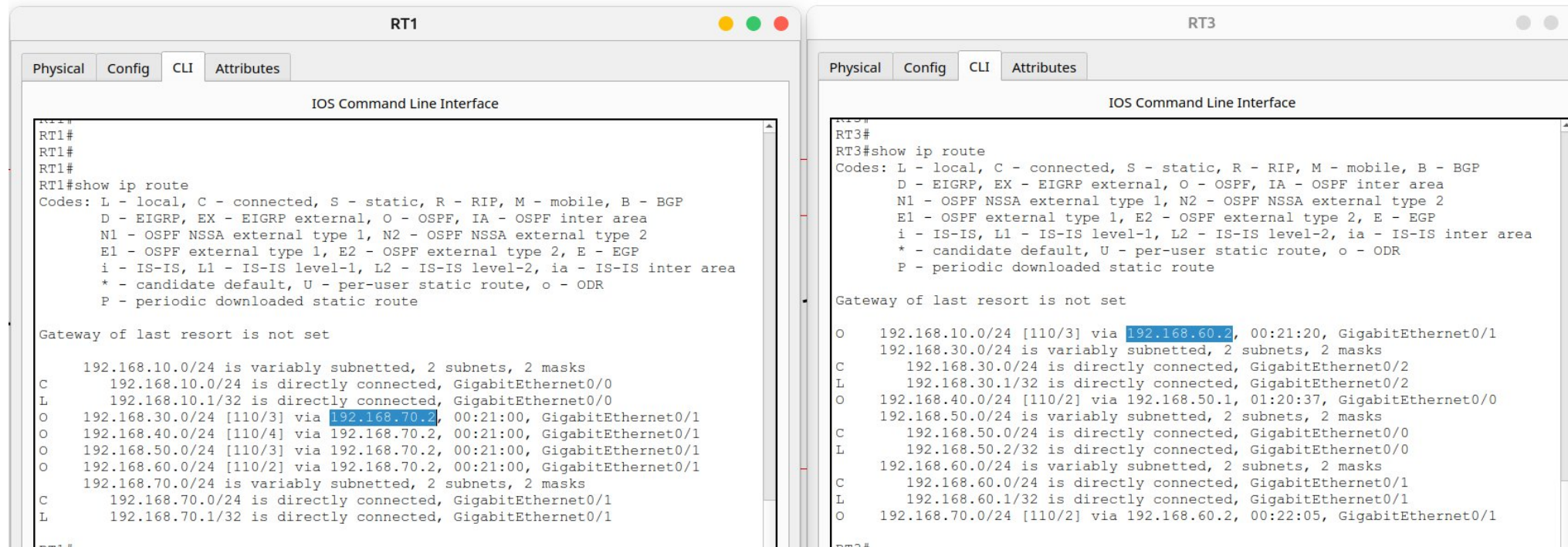


Testing OSPF

WAN

HSRP

Routes between devices are proved by OSPF



The image displays two network simulator windows, RT1 and RT3, showing the output of the 'show ip route' command. Both routers are running OSPF and have learned routes from each other. The routes are listed with their codes (L for local, C for connected, O for OSPF), network addresses, masks, and next-hop information.

RT1 Output:

```
RT1#
RT1#
RT1#
RT1#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

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       192.168.30.0/24 [110/3] via 192.168.70.2, 00:21:00, GigabitEthernet0/1
O       192.168.40.0/24 [110/4] via 192.168.70.2, 00:21:00, GigabitEthernet0/1
O       192.168.50.0/24 [110/3] via 192.168.70.2, 00:21:00, GigabitEthernet0/1
O       192.168.60.0/24 [110/2] via 192.168.70.2, 00:21:00, GigabitEthernet0/1
192.168.70.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.70.0/24 is directly connected, GigabitEthernet0/1
L       192.168.70.1/32 is directly connected, GigabitEthernet0/1
```

RT3 Output:

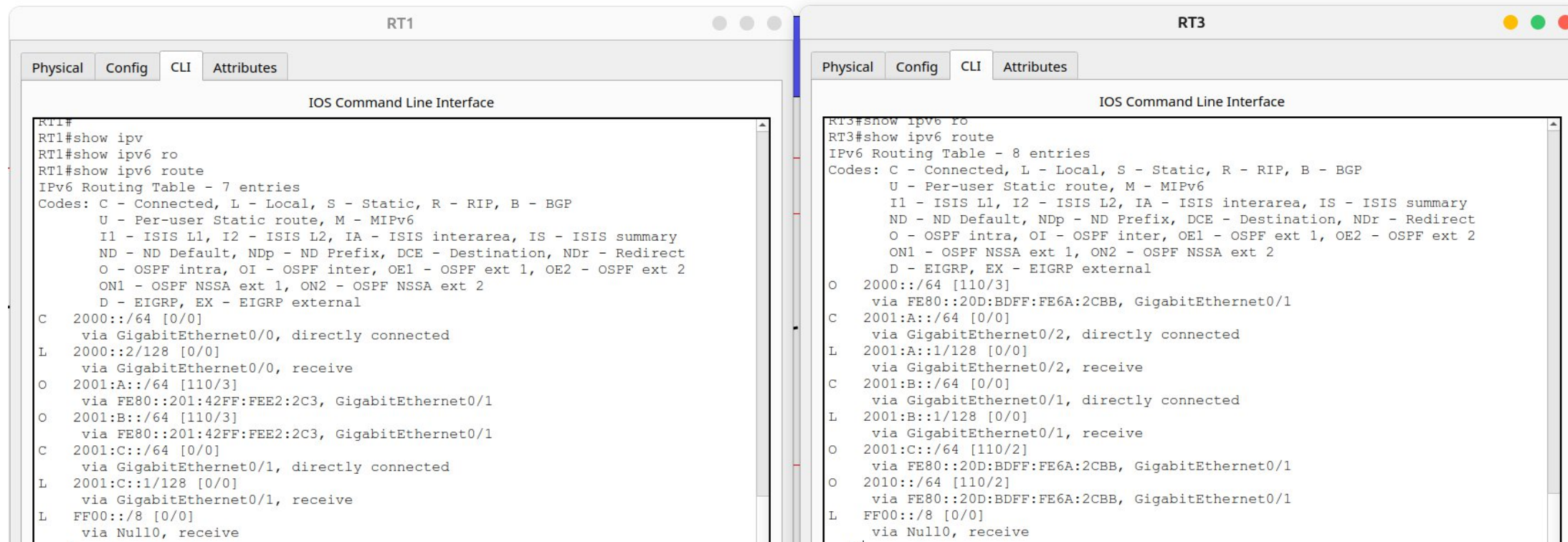
```
RT3#
RT3#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, 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

O       192.168.10.0/24 [110/3] via 192.168.60.2, 00:21:20, GigabitEthernet0/1
192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.30.0/24 is directly connected, GigabitEthernet0/2
L       192.168.30.1/32 is directly connected, GigabitEthernet0/2
O       192.168.40.0/24 [110/2] via 192.168.50.1, 01:20:37, GigabitEthernet0/0
192.168.50.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.50.0/24 is directly connected, GigabitEthernet0/0
L       192.168.50.2/32 is directly connected, GigabitEthernet0/0
192.168.60.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.60.0/24 is directly connected, GigabitEthernet0/1
L       192.168.60.1/32 is directly connected, GigabitEthernet0/1
O       192.168.70.0/24 [110/2] via 192.168.60.2, 00:22:05, GigabitEthernet0/1
```

HSRP

Routes between devices are proved by OSPFv3



The image displays two network simulator windows, RT1 and RT3, showing the output of the 'show ipv6 route' command. Both routers are running OSPFv3 and have learned routes for various IPv6 prefixes.

RT1 Output:

```
RT1#
RT1#show ipv6
RT1#show ipv6 ro
RT1#show ipv6 route
IPv6 Routing Table - 7 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
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
C 2000::/64 [0/0]
  via GigabitEthernet0/0, directly connected
L 2000::2/128 [0/0]
  via GigabitEthernet0/0, receive
O 2001:A::/64 [110/3]
  via FE80::201:42FF:FEE2:2C3, GigabitEthernet0/1
O 2001:B::/64 [110/3]
  via FE80::201:42FF:FEE2:2C3, GigabitEthernet0/1
C 2001:C::/64 [0/0]
  via GigabitEthernet0/1, directly connected
L 2001:C::1/128 [0/0]
  via GigabitEthernet0/1, receive
L FF00::/8 [0/0]
  via Null0, receive
```

RT3 Output:

```
RT3#show ipv6 ro
RT3#show ipv6 route
IPv6 Routing Table - 8 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
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
O 2000::/64 [110/3]
  via FE80::20D:BDFF:FE6A:2CBB, GigabitEthernet0/1
C 2001:A::/64 [0/0]
  via GigabitEthernet0/2, directly connected
L 2001:A::1/128 [0/0]
  via GigabitEthernet0/2, receive
C 2001:B::/64 [0/0]
  via GigabitEthernet0/1, directly connected
L 2001:B::1/128 [0/0]
  via GigabitEthernet0/1, receive
O 2001:C::/64 [110/2]
  via FE80::20D:BDFF:FE6A:2CBB, GigabitEthernet0/1
O 2010::/64 [110/2]
  via FE80::20D:BDFF:FE6A:2CBB, GigabitEthernet0/1
L FF00::/8 [0/0]
  via Null0, receive
```


HSRP

Bidirectional trace route between Sydney Branch and Brisbane Branch over IPv4

The image displays two terminal windows side-by-side, each showing the output of a traceroute command. The left window, titled 'TEST10-1', shows a traceroute from 192.168.10.1 to 192.168.30.99. The right window, titled 'TEST30-1', shows a traceroute from 192.168.30.1 to 192.168.10.99. Both traces show three hops with 0 ms latency at each step.

```
TEST10-1
C:\>
C:\>
C:\>tracert 192.168.30.99

Tracing route to 192.168.30.99 over a maximum of 30 hops:

  1  0 ms    0 ms    0 ms    192.168.10.1
  2  0 ms    0 ms    0 ms    192.168.60.1
  3  0 ms    0 ms    0 ms    192.168.30.99

Trace complete.

C:\>
```

```
TEST30-1
C:\>
C:\>
C:\>tracert 192.168.10.99

Tracing route to 192.168.10.99 over a maximum of 30 hops:

  1  0 ms    0 ms    0 ms    192.168.30.1
  2  0 ms    0 ms    0 ms    192.168.70.1
  3  0 ms    0 ms    0 ms    192.168.10.99

Trace complete.

C:\>
```


HSRP

Bidirectional trace route between Sydney Branch and Brisbane Branch over IPv6

The image shows two side-by-side Windows command prompt windows. The left window, titled 'TEST2000-99_', shows a traceroute from Sydney Branch to Brisbane Branch. The right window, titled 'TEST2001A-1', shows a traceroute from Brisbane Branch back to Sydney Branch. Both traceroutes show a path of four hops with 0 ms latency at each step.

```
TEST2000-99_
C:\>
C:\>tracert 2001:a::99

Tracing route to 2001:a::99 over a maximum of 30 hops:

  1  0 ms    0 ms    0 ms    2000::2
  2  0 ms    0 ms    0 ms    2001:C::2
  3  0 ms    0 ms    0 ms    2001:B::1
  4  0 ms    0 ms    0 ms    2001:A::99

Trace complete.
```

```
TEST2001A-1
C:\>
C:\>tracert 2000::99

Tracing route to 2000::99 over a maximum of 30 hops:

  1  0 ms    0 ms    0 ms    2001:A::1
  2  0 ms    0 ms    0 ms    2001:B::2
  3  0 ms    0 ms    0 ms    2001:C::1
  4  0 ms    0 ms    0 ms    2000::99

Trace complete.
```

The left side of the slide features several abstract, overlapping gray shapes. These shapes are irregular and organic, resembling soft-edged polygons or blobs. They are arranged in a way that they appear to be layered, with some shapes partially obscuring others. The colors are various shades of gray, from light to medium-dark.

Testing ACL

WAN – IPv4

ACL

Example ACL on R1 (Sydney Branch)

```
RT1
RT1#
RT1#show access-lists
Extended IP access list 110
 10 permit ip 192.168.10.0 0.0.0.255 192.168.30.0 0.0.0.255
 20 permit ip 192.168.10.0 0.0.0.255 192.168.40.0 0.0.0.255
(1 match(es))
 30 permit ip 192.168.30.0 0.0.0.255 192.168.10.0 0.0.0.255
 40 permit ip 192.168.40.0 0.0.0.255 192.168.10.0 0.0.0.255
```

ACL

Deny rule for testing traffic from 192.168.10.99 (Brisbane)

```
RT1#show access-lists
Extended IP access list 110
 10 deny ip 192.168.10.0 0.0.0.255 192.168.30.0 0.0.0.255
 20 deny ip 192.168.30.0 0.0.0.255 192.168.10.0 0.0.0.255
```

```
Pinging 192.168.10.99 with 32 bytes of data:
```

```
Request timed out.
Request timed out.
Request timed out.
Request timed out.
```

```
Ping statistics for 192.168.10.99:
```

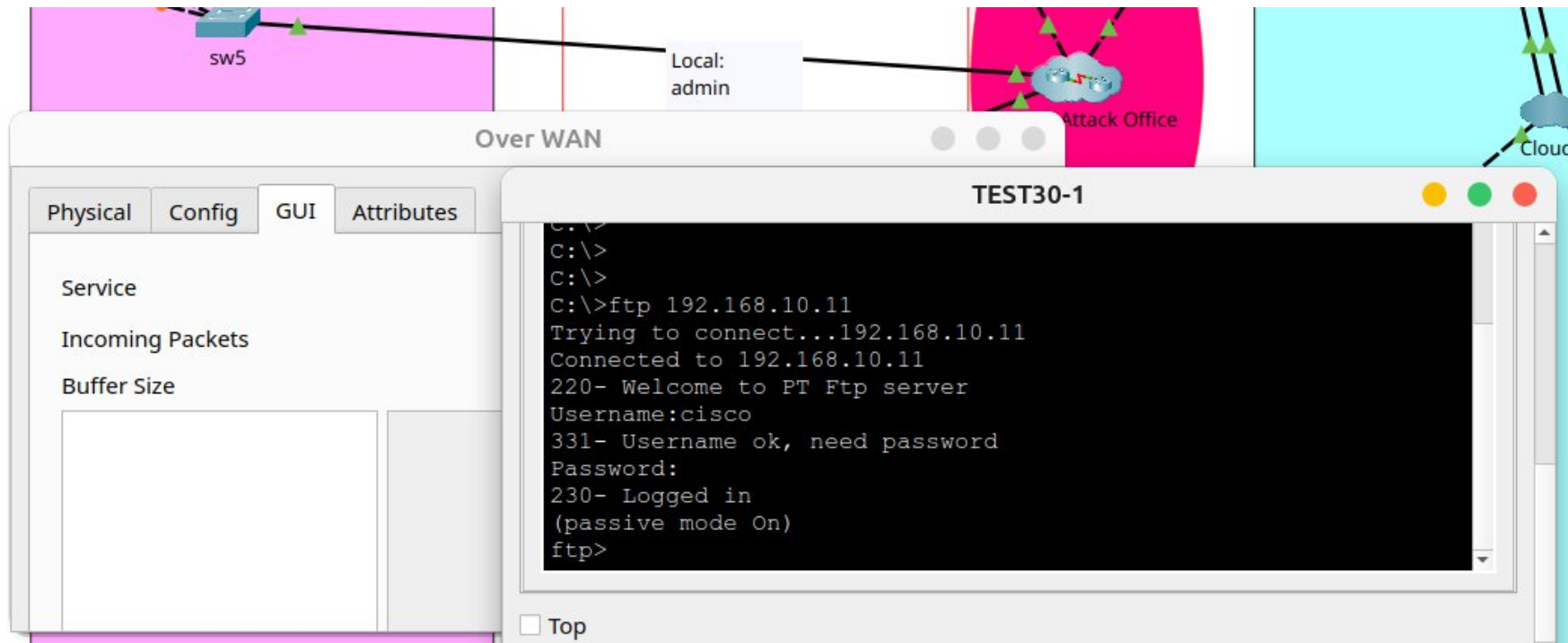
```
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Testing VPN Site-To-Site

WAN – IPv4

VPN Site-To-Site

Internet connection are intercepted by a criminal sniffer.
FTP Messages cannot be captured.



VPN Site-To-Site

Local connections are susceptible to attacks.
FTP Messages can be captured.

The image displays two overlapping windows. The left window, titled "On Sydney", is a network capture tool interface. It shows settings for "Service" (On), "Incoming Packets" (Port0), and "Buffer Size" (256). A list on the left includes "FTP" and "FTP". The main pane shows a packet capture for "FTP" with a "DATA (VARIABLE LENGTH)" field and a "Padding: 0" field. Below this, the "FTP Command" is "USER" and the "FTP Argument" is "cisco". The right window, titled "TEST10-1", is a terminal window showing the output of an FTP client command. It displays connection statistics, round trip times, and the successful login of the user "cisco".

On Sydney

Service: ☒ On ☐ Off

Incoming Packets: ☒ Port0 ☐ Port1

Buffer Size: 256

FTP

FTP

DATA (VARIABLE LENGTH) | PADDING: 0

FTP Command

0 | 4 | 8 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 | 68 | 72 | 76 | 80 | 84 | 88 | 92 | 96 | 100 | 104 | 108 | 112 | 116 | 120 | 124 | 128 | 132 | 136 | 140 | 144 | 148 | 152 | 156 | 160 | 164 | 168 | 172 | 176 | 180 | 184 | 188 | 192 | 196 | 200 | 204 | 208 | 212 | 216 | 220 | 224 | 228 | 232 | 236 | 240 | 244 | 248 | 252 | 256 | Bytes

FTP Command:USER

FTP Argument:cisco

TEST10-1

```
Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 0ms, Maximum = 1ms, Average = 0ms

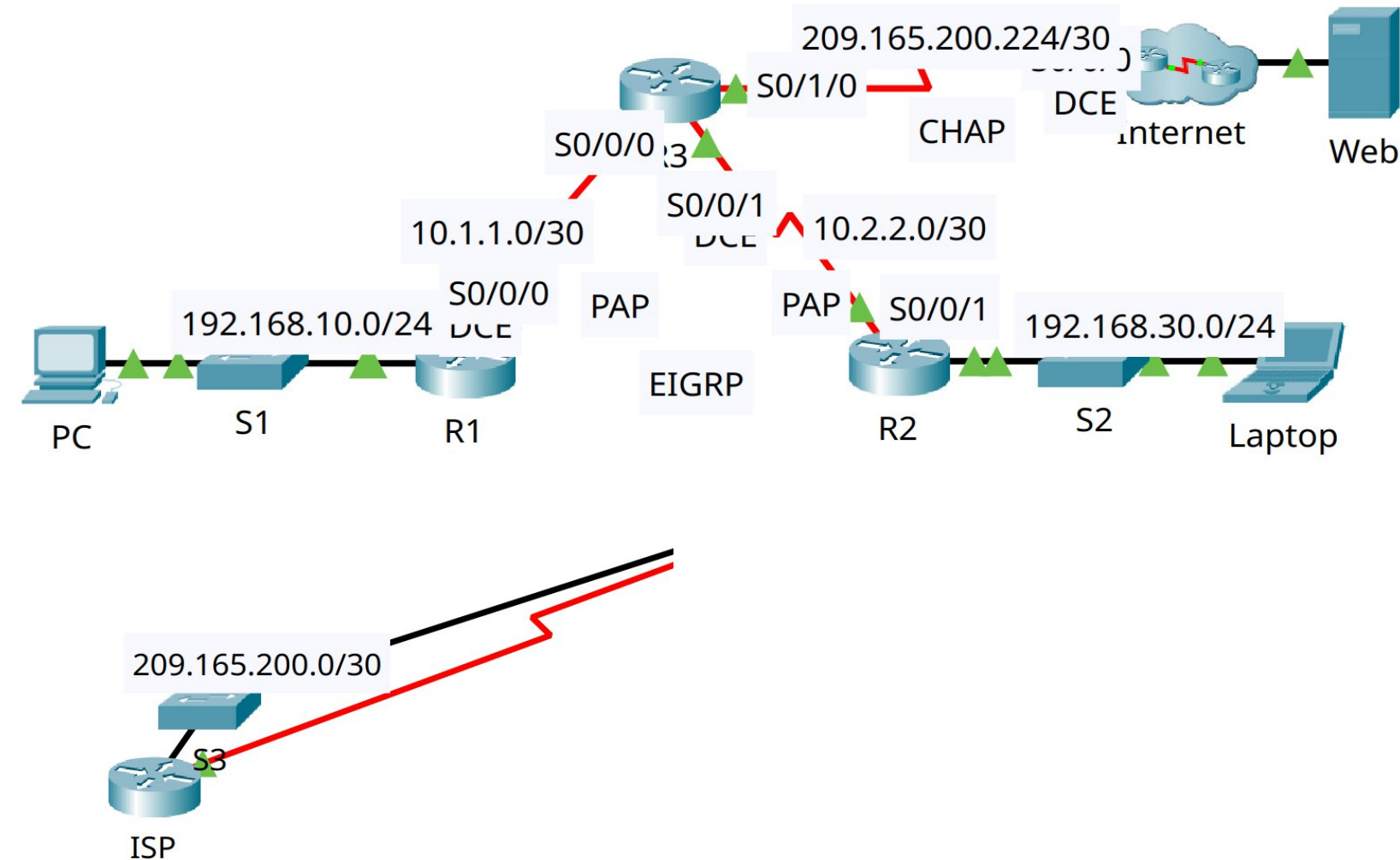
Control-C
^C
C:\>ftp 192.168.10.11
Trying to connect...192.168.10.11
Connected to 192.168.10.11
220- Welcome to PT Ftp server
Username:cisco
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>
```

Testing Encapsulation PPP

IPv4

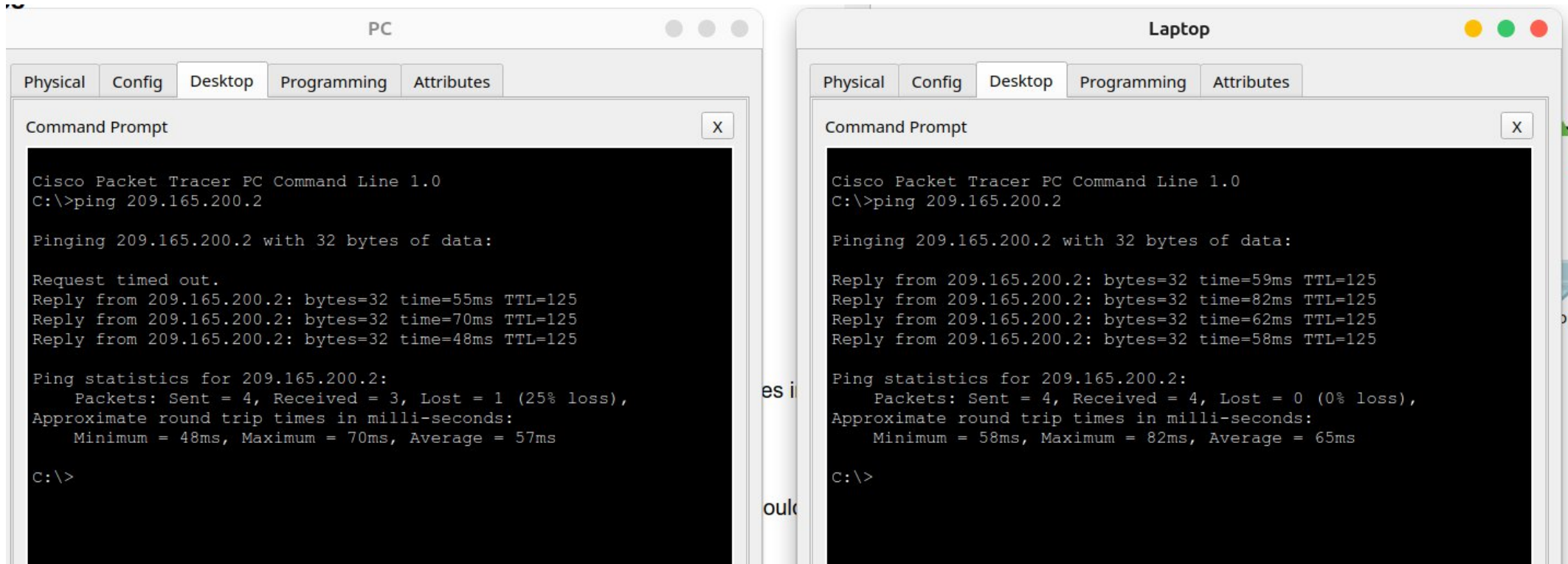
Encapsulation PPP

Implemented
CHAP as an
automatic
authentication
method.



Encapsulation PPP

Connection from Local network to WEB server are working under encapsulation method. CHAP implemented.



The image displays two side-by-side Cisco Packet Tracer Command Prompt windows. The left window is titled 'PC' and the right window is titled 'Laptop'. Both windows show the results of a ping command to the IP address 209.165.200.2. The PC window shows a 25% loss (1 packet lost), while the Laptop window shows 0% loss (0 packets lost).

```
PC
-----
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 209.165.200.2

Pinging 209.165.200.2 with 32 bytes of data:

Request timed out.
Reply from 209.165.200.2: bytes=32 time=55ms TTL=125
Reply from 209.165.200.2: bytes=32 time=70ms TTL=125
Reply from 209.165.200.2: bytes=32 time=48ms TTL=125

Ping statistics for 209.165.200.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 48ms, Maximum = 70ms, Average = 57ms

C:\>
```

```
Laptop
-----
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 209.165.200.2

Pinging 209.165.200.2 with 32 bytes of data:

Reply from 209.165.200.2: bytes=32 time=59ms TTL=125
Reply from 209.165.200.2: bytes=32 time=82ms TTL=125
Reply from 209.165.200.2: bytes=32 time=62ms TTL=125
Reply from 209.165.200.2: bytes=32 time=58ms TTL=125

Ping statistics for 209.165.200.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 58ms, Maximum = 82ms, Average = 65ms

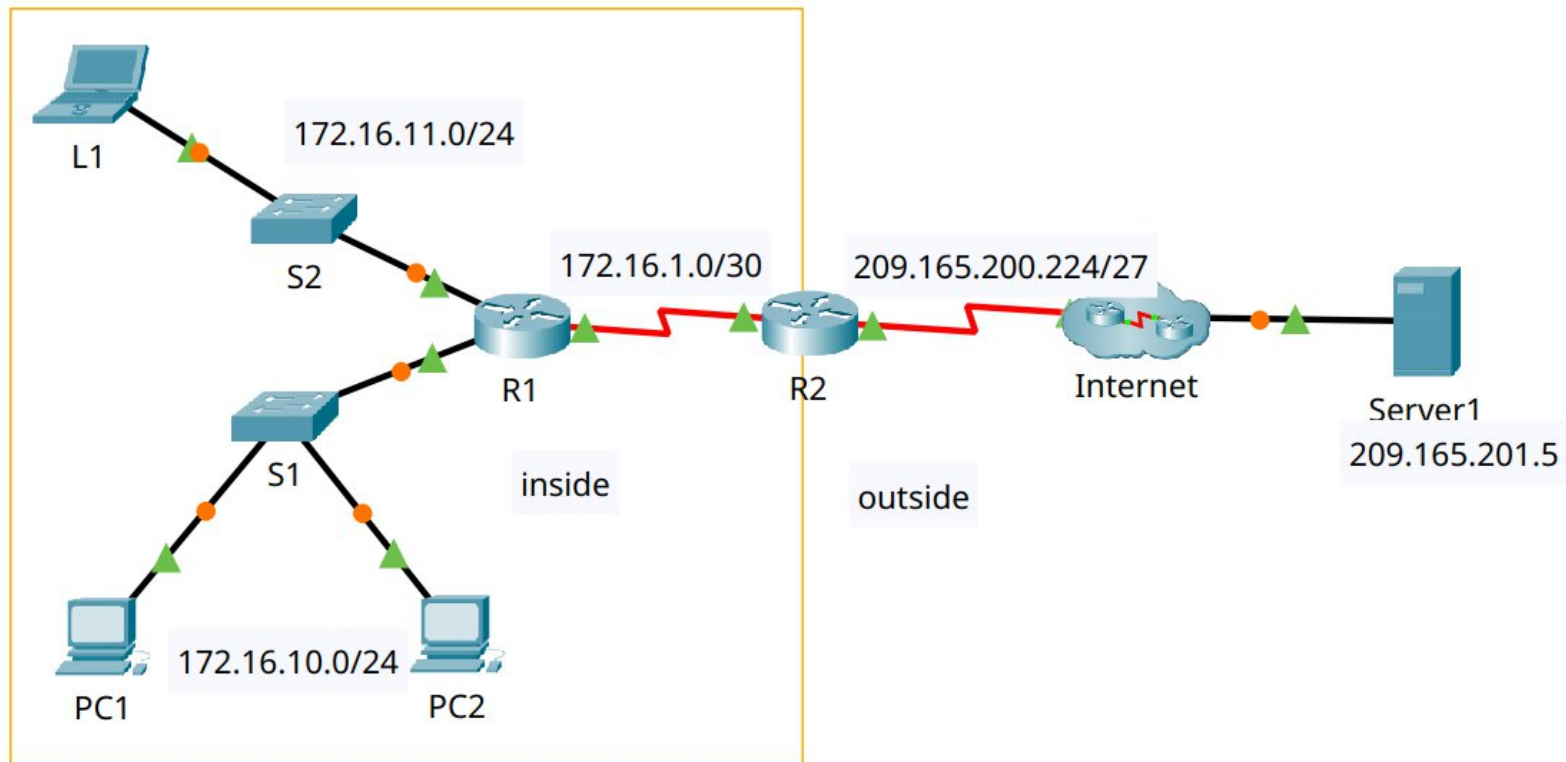
C:\>
```

Dynamic NAT

IPv4

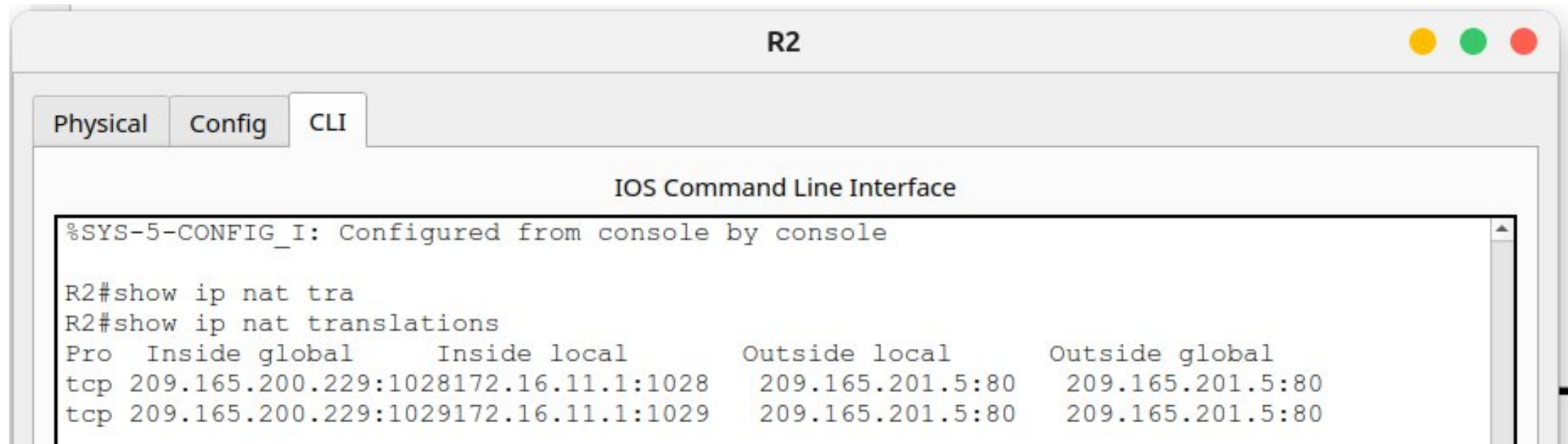
Dynamic NAT

WAN Network



Dynamic NAT

R2 NAT Translations table on



The screenshot shows a terminal window titled 'R2' with three tabs: 'Physical', 'Config', and 'CLI'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The output of the command 'show ip nat translations' is shown, indicating two active NAT translations for TCP traffic from the inside network (172.16.11.1 and 172.16.11.1) to the outside network (209.165.201.5).

```
%SYS-5-CONFIG_I: Configured from console by console

R2#show ip nat tra
R2#show ip nat translations
Pro  Inside global      Inside local       Outside local      Outside global
tcp  209.165.200.229:1028 172.16.11.1:1028   209.165.201.5:80   209.165.201.5:80
tcp  209.165.200.229:1029 172.16.11.1:1029   209.165.201.5:80   209.165.201.5:80
```

Dynamic NAT

Testing WEB connection

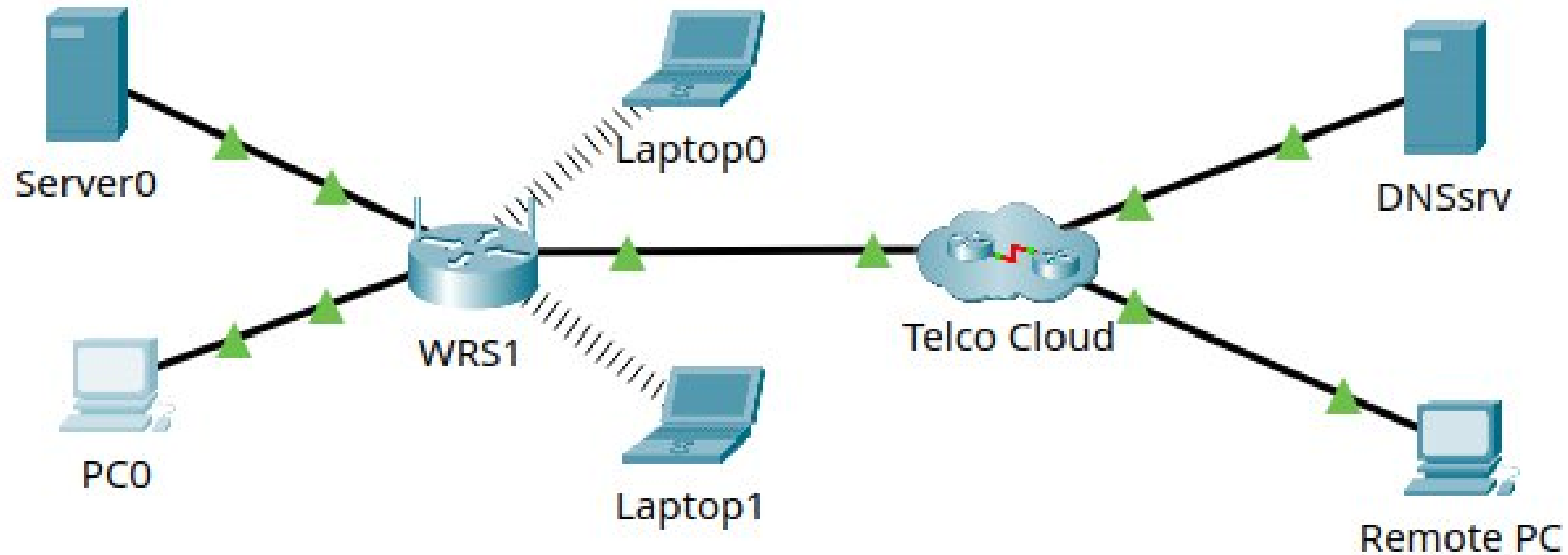


Testing Firewall and Single-port

IPv4

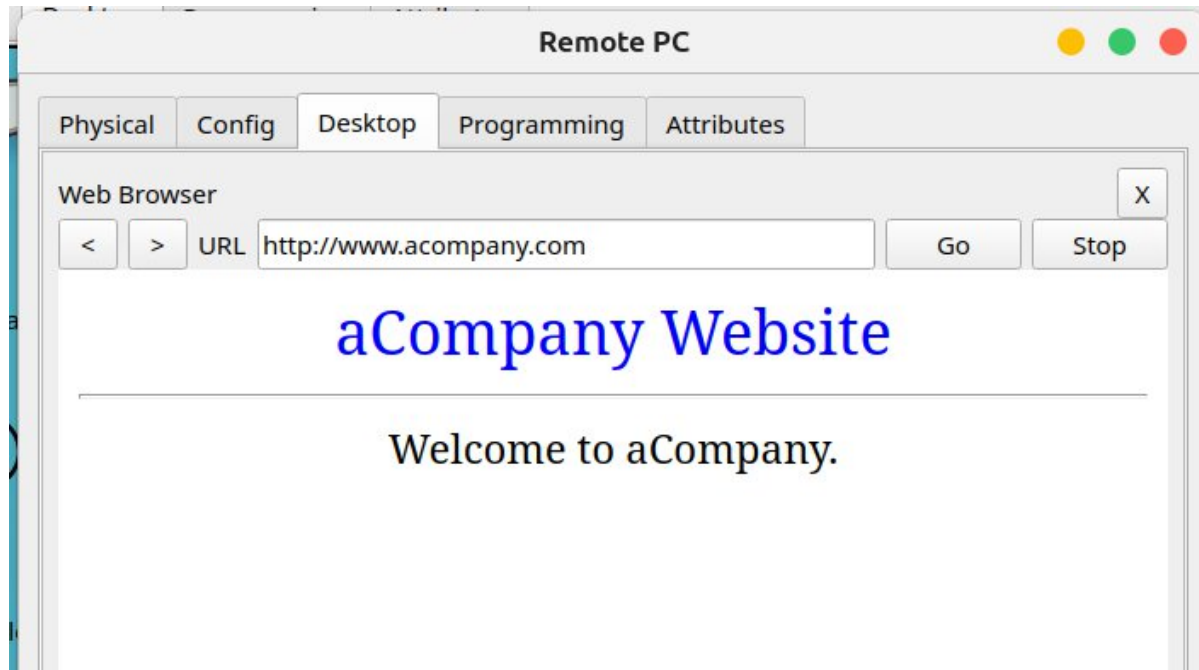
Firewall Single-port

WAN network



Firewall Single-port

Single-port enabled and DMZ disabled



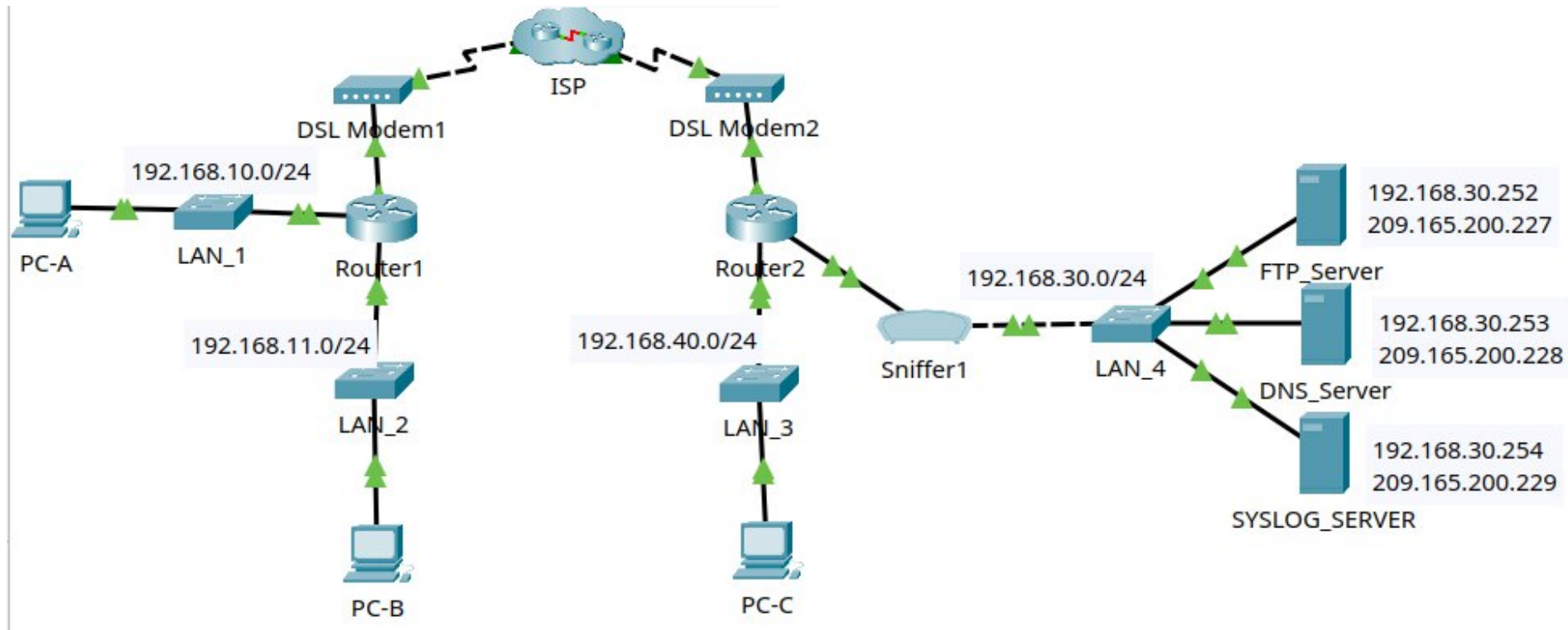
Connection from
Remote PC to WEB
Server

Logging Network

IPv4

Logging

WAN Network



Logging

Echo replies from R2 to PC-C its destination is LAN interface of R2 (because is its local network)

Syslog

Service

☒ On

☐ Off

	Time	HostName	Message
1	02.13.2020 ...	192.168.30.1	...1, dst 192.168.40.2
2	02.13.2020 ...	192.168.30.1	...
3	02.13.2020 ...	192.168.30.1	...
4	02.13.2020 ...	192.168.30.1	...

Summary Technologies & Protocols





Summary Technologies

DHCP (Dynamic Host Configuration Protocol):

Automatically assigns IP, gateway, and DNS addresses to devices on the network

LACP (Link Aggregation Control Protocol):

Combines several physical links to form a single logical link for the purpose of increasing bandwidth also providing redundancy when one of the switches fails.



Summary Technologies

HSRP (Hot Standby Router Protocol):

Provides redundancy. If the primary router fails, another router automatically takes over, ensuring service continuity.

OSPF (Open Shortest Path First):

Dynamic routing that allows the calculation of the most efficient route to send packets in a network.



Summary Technologies

ACLs (Access Control Lists):

Rules applied to allow or deny traffic. They are used to filter traffic and improve security.

VPN IPsec (Internet Protocol Security):

Creates secure (encrypted) connections over the Internet between two networks (site-to-site), protecting data confidentiality and integrity.



Summary Technologies

PPP Authentication (Point-to-Point Protocol Authentication):

Responsible for establishing point-to-point connections and provides encapsulation to facilitate the connection. Also supports authentication mechanisms (CHAP) between two network devices to add an additional layer of security.



Summary Technologies

Dynamic NAT (Dynamic Network Address Translation):

Map a public network to multiple private networks on a WAN to communicate with external IPs..

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- Dynamic NAT: [ComputerNetworkingNotes - Dynamic NAT](#)

Thanks!

