Link Aggregation Control Protocol(LACP)

Link Aggregation Control Protocol (LACP) is a Layer 2 protocol used to combine multiple physical links between two network switches into a single logical link. The main advantages of using LACP include:

Increased Bandwidth: By aggregating multiple links, LACP allows for greater bandwidth between devices, effectively enhancing data transfer speeds across the network.

Avoidance of STP Blockage: LACP helps in bypassing issues related to Spanning Tree Protocol (STP), which typically disables redundant links to prevent looping and broadcast storms. With LACP, all links can be active simultaneously without the risk of creating loops, as the protocol manages these links as a single logical connection.

This configuration not only optimizes the use of available physical links but also improves the overall reliability and efficiency of the network infrastructure.

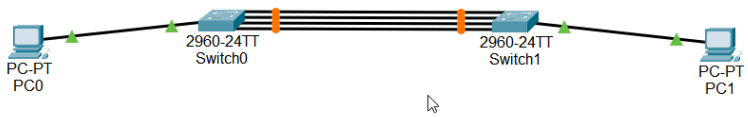
Link Aggregation Control Protocol (LACP) using Cisco Packet Tracer, enabling the aggregation of multiple physical links into a single logical link between two switches, which enhances bandwidth and avoids issues caused by Spanning Tree Protocol (STP):

Equipment Needed

- Two Cisco 2960 switches
- Two PCs

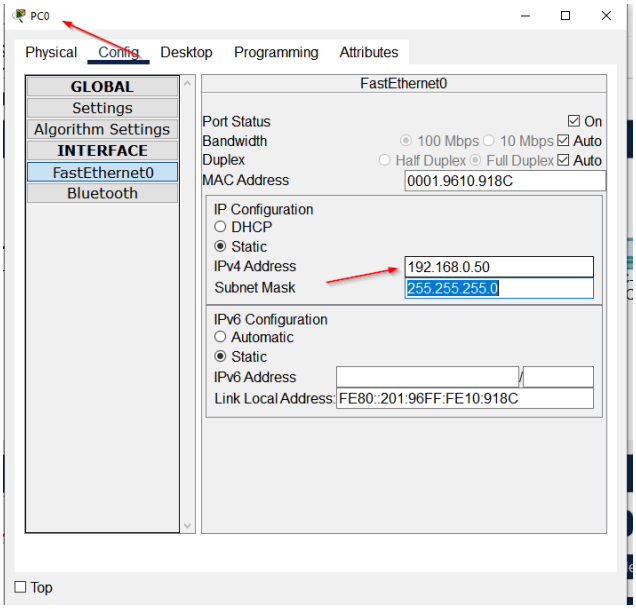
Step 1: Setup the Network

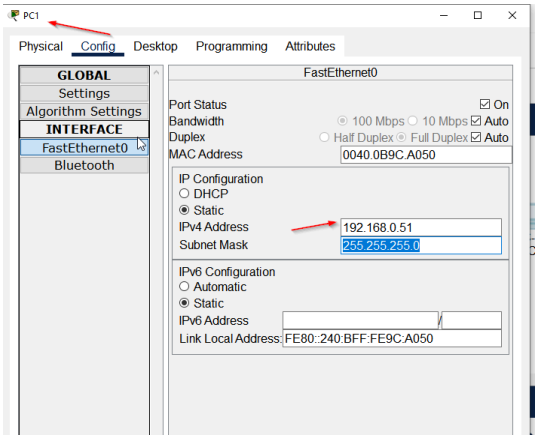
1. Place two Cisco 2960 switches on the Packet Tracer workspace.
2. Add two PCs and connect each to a different switch using straight-through cables (lightning connection icon in Packet Tracer).



Step 2: Configure PC IP Addresses

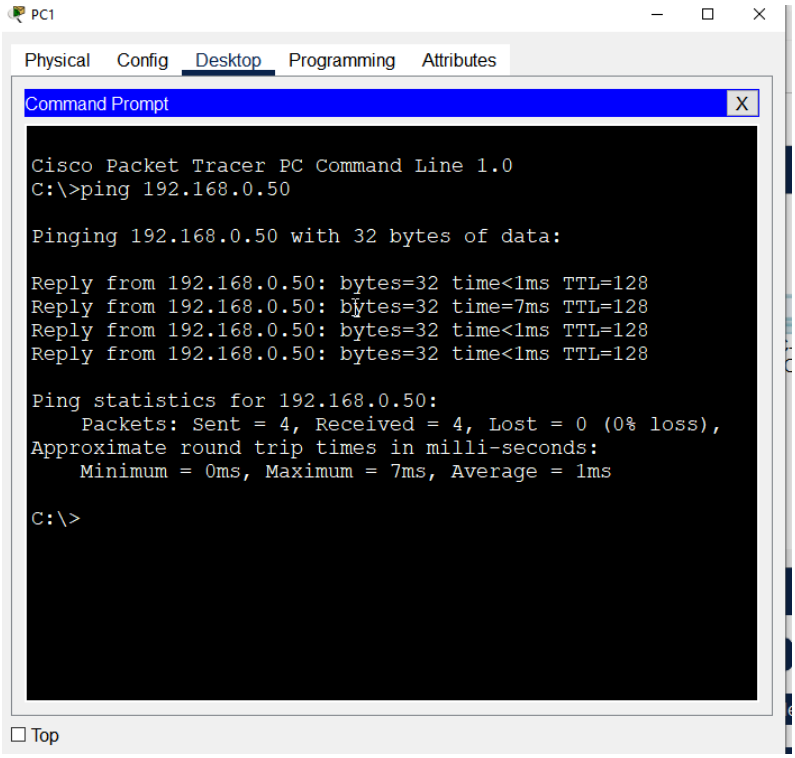
1. Set IP addresses on the PCs to ensure they are on the same subnet:
    - PC0: IP `192.168.0.50`, Subnet Mask `255.255.255.0` (No default gateway needed)
    - PC1: IP `192.168.0.51`, Subnet Mask `255.255.255.0` (No default gateway needed)





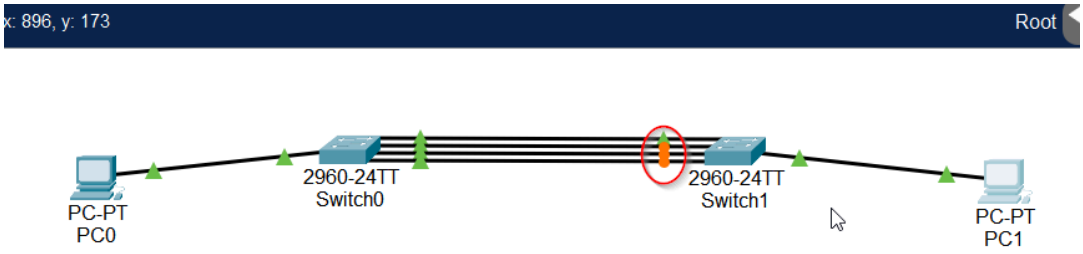
Step 3: Test Initial Connectivity

1. Verify connectivity between the two PCs by pinging from one PC to the other (e.g., PC0 pings PC1).



Step 4: Observe STP Effect

1. Identify blocked ports due to STP which prevents loops but limits bandwidth by disabling redundant links.



Step 5: Configure LACP on Switches

1. Access the CLI of the first switch.
2. Enable configuration mode:

3. Select the interfaces for LACP configuration:
    - interface range fastEthernet 0/2 - 5

4. Assign interfaces to an EtherChannel group with LACP enabled:
    - channel-group 1 mode active
    - channel-protocol lacp

5. Exit configuration mode:
- exit
- exit

6. Check EtherChannel configuration:
   show etherchannel summary

```
Switch>en
Switch>enable
Switch#config
Switch#configure
Switch#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
Switch(config)#int range  f0/2-5
Switch(config-if-range)#channel-group 1 mode active
Switch(config-if-range)#
Creating a port-channel interface Port-channel 1

%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/2, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/3, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/4, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/5, changed state to down
Switch(config-if-range)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show
Switch#show ether
Switch#show etherchannel summ
Switch#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
------+-------------+-----------+-----------------------------------------------
```

Step 6: Verify LACP Configuration

1. Check EtherChannel on the second switch after configuration:

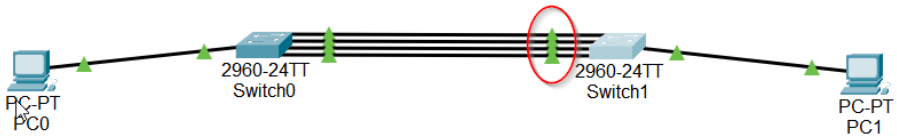
- show etherchannel summary

```
Switch#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    Fa0/2(P) Fa0/3(P) Fa0/4(P) Fa0/5(P)
Switch#
```



Step 7: Test Final Connectivity

1. Verify network connectivity post-LACP configuration:
    - From a PC, ping the other PC to confirm that the aggregated link allows for uninterrupted connectivity.

```
C:\>ping 192.168.0.50

Pinging 192.168.0.50 with 32 bytes of data:

Reply from 192.168.0.50: bytes=32 time<1ms TTL=128
Reply from 192.168.0.50: bytes=32 time<1ms TTL=128
Reply from 192.168.0.50: bytes=32 time<1ms TTL=128
Reply from 192.168.0.50: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.50:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Conclusion

This setup demonstrates how to configure LACP on Cisco switches to utilize full bandwidth across multiple physical links, enhancing network performance and reliability by effectively managing potential STP issues.