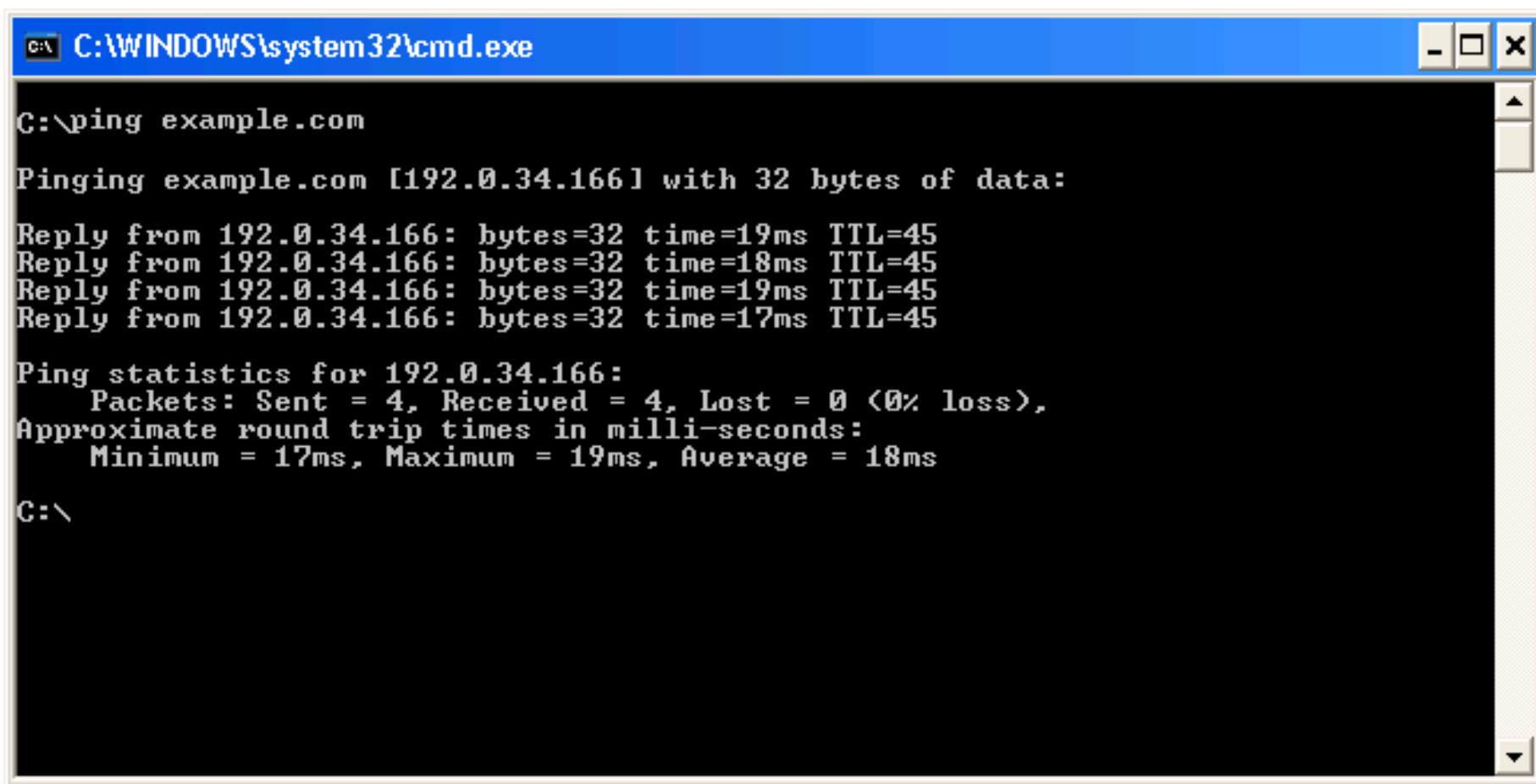




# ICMP and Traceroute

# Host-Based Tools: ping



```
C:\WINDOWS\system32\cmd.exe

C:\>ping example.com

Pinging example.com [192.0.34.166] with 32 bytes of data:

Reply from 192.0.34.166: bytes=32 time=19ms TTL=45
Reply from 192.0.34.166: bytes=32 time=18ms TTL=45
Reply from 192.0.34.166: bytes=32 time=19ms TTL=45
Reply from 192.0.34.166: bytes=32 time=17ms TTL=45

Ping statistics for 192.0.34.166:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 17ms, Maximum = 19ms, Average = 18ms

C:\>
```

# ping

```
Router# ping [[protocol {host-name | system-address}]
```

- To diagnose basic network connectivity, use the ping command in user EXEC or privileged EXEC mode.

# Host-Based Tools: tracert

```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\pvancil>tracert yahoo.com

Tracing route to yahoo.com [66.94.234.13]
over a maximum of 30 hops:

  1      1 ms      1 ms      1 ms      rtp-pvancil-vpn.cisco.com [10.83.2.161]
  2     67 ms     59 ms     57 ms     rtp5-access-sdg1-t10.cisco.com [10.82.96.2]
  3     58 ms     58 ms     57 ms     rtp5-access-gw1-vlan100.cisco.com [10.83.100.9]

  4     58 ms     58 ms     57 ms     rtp7-bb-gw1-ge5-8.cisco.com [10.81.254.117]
  5     60 ms     59 ms     57 ms     rtp5-rbb-gw1-ge4-2.cisco.com [10.81.254.181]
  6     58 ms     59 ms     60 ms     rtp5-corp-gw1.cisco.com [10.81.254.194]
  7     59 ms     58 ms     58 ms     rtp7-dmzbb-gw1.cisco.com [64.102.241.135]
  8     60 ms     60 ms     58 ms     rtp1-isp-gw1-g1-2.cisco.com [64.102.254.193]
  9     59 ms     58 ms     58 ms     rtp5-isp-ssw1-v110.cisco.com [64.102.254.174]
 10     59 ms     59 ms     58 ms     rtp5-isp-ssw1-v151.cisco.com [64.102.254.249]
 11     60 ms     60 ms     59 ms     rtp1-isp-gw1-v100.cisco.com [64.102.254.165]
 12     64 ms     66 ms     65 ms     sl-gw20-rlly-1-0.sprintlink.net [144.232.244.209]

 13     64 ms     66 ms     68 ms     sl-bb20-rlly-3-2.sprintlink.net [144.232.14.29]
 14     66 ms     64 ms     65 ms     sl-bb24-rlly-9-0.sprintlink.net [144.232.14.122]

 15     66 ms     66 ms     69 ms     sl-st22-ash-5-0.sprintlink.net [144.232.20.155]

 16     67 ms     68 ms     67 ms     te-4-2.car4.Washington1.Level3.net [4.68.111.169]
 17     67 ms    127 ms     68 ms     ae-2-54.bbr2.Washington1.Level3.net [4.68.121.97]

 18    136 ms      *      137 ms     as-1-0.bbr2.SanJose1.Level3.net [64.159.0.242]
 19    134 ms    136 ms    133 ms     ae-23-52.car3.SanJose1.Level3.net [4.68.123.45]

 20    142 ms    135 ms    135 ms     4.71.112.14
 21    133 ms    134 ms    134 ms     ge-3-0-0-p271.msr2.scd.yahoo.com [216.115.106.19]
 22    135 ms    135 ms    135 ms     ten-2-3-bas1.scd.yahoo.com [66.218.82.221]
 23    136 ms    136 ms    135 ms     w2.rc.vip.scd.yahoo.com [66.94.234.13]

Trace complete.
```

# traceroute

```
Router# traceroute [protocol] destination
```

- To discover the routes that packets will actually take when traveling to their destination address, use the traceroute command in user EXEC or privileged EXEC mode.



# Redundancy in Static Route

## IP SLA

# Cisco IOS IP SLA

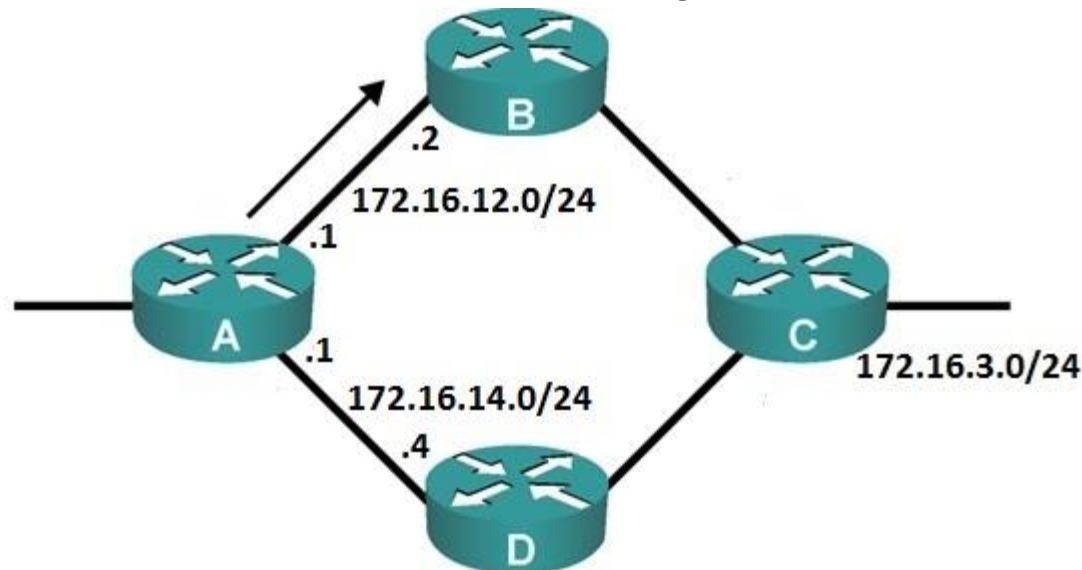
- Cisco IOS IP Service Level Agreement (SLA) performs network performance measurement within Cisco System devices.
- IP SLA actively sends data across the network in a continuous, reliable, predictable manner to measure performance between multiple network locations or across multiple network paths.
- The following steps are required to configure Cisco IP SLA:
  - Define one or more probes.
  - Define one or more tracking objects.
  - Define the action for each tracking object.

# Using IP SLA

The administrator can use IP SLA for choose the primary path and backup path for a topology using only static routing.

Considering the following example:

- The administrator at router A wants to use the path transit through B as the primary path to subnet 172.16.3.0/24 and the path transit through D is used as the backup path.
- The routing technique is used is static routing.





# Using IP SLA (Cont.)

- Static routes on router A are configured using AD to establish primary route and backup route:

```
A(config)#ip route 172.16.3.0 255.255.255.0 172.16.12.2 5  
A(config)#ip route 172.16.3.0 255.255.255.0 172.16.14.4 10
```

- With the configuration above, if the link connect router A and router B down, static route with next – hop is router D will be used to forward traffic to subnet 172.16.3.0.
- However, if the link is down at router B, router A cannot discover this breakdown and the redundancy is not performed.
- The solution to the above issue is to use Cisco IP SLA functionality , which can be used to continuously check the reachability of a specific next – hop IP and conditionally announce the static route if the connectivity is verified.

# Using IP SLA (Cont.)

```
A(config)#ip sla 1
A(config-ip-sla)#icmp-echo 172.16.12.2 source-ip 172.16.12.1
A(config-ip-sla-echo)#frequency 10
A(config-ip-sla-echo)#exit
A(config)#ip sla schedule 1 start-time now life forever
```

- Set the probe to send an ICMP packet every 10 seconds to IP address 172.16.12.2.
- Start sending packets now and continues forever.

```
A(config)#track 1 ip sla 1 reachability
```

- Define the tracking of object 1 linked to IP SLA 1.

```
A(config)#ip route 172.16.3.0 255.255.255.0 172.16.12.2 5
track 1
```

- Announces the static route with next – hop IP 172.16.12.2 with administrative distance of 5 if tracking object 1 is true.

