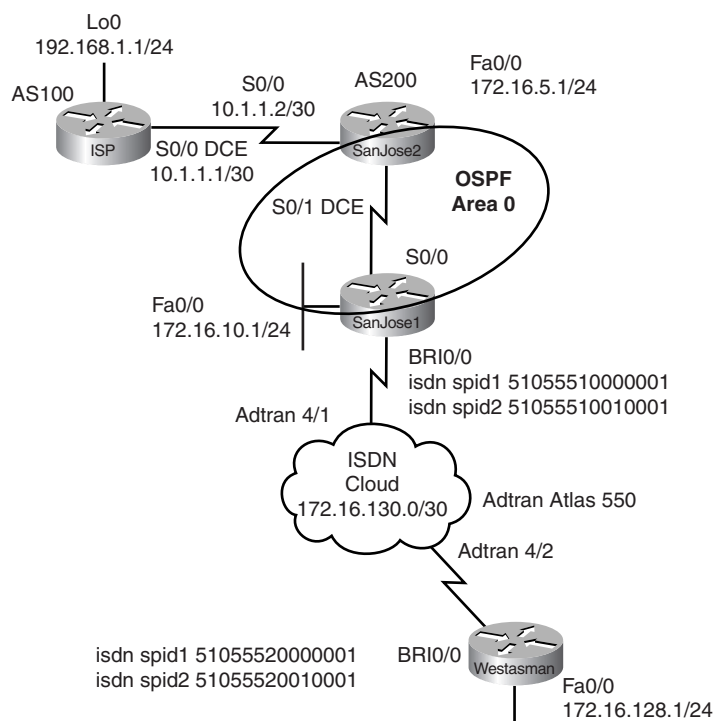


Case Study 1: ISDN, OSPF, and BGP Solution

Objective

In this case study, you troubleshoot a complex scenario involving ISDN, Open Shortest Path First (OSPF), and Border Gateway Protocol (BGP). Figure 1-1 shows the topology for this case study.

Figure 1-1 Topology for the Case Study



Scenario

The International Travel Agency (ITA) hired you as a networking consultant to help troubleshoot and fix several problems it is having with its network. A few days ago, ITA changed service providers. In the middle of the changeover, the service provider experienced an employee turnover issue. The result was that the configuration information from the service provider was incorrect, and ITA no longer has a functioning Internetwork. Currently, ITA end users are unable to reach other offices or the Internet. You need to use the following specifications.

Using Figure 1-1, configure the network with the following specifications:

- All routers should be able to reach (ping) all interfaces on the other routers.
- All interfaces on all routers should be able to reach the Internet. You can test this by pinging the loopback address on ISP 192.168.1.1.

- Westasman's users should be able to initiate communication with SanJose1, SanJose2, and the Internet via the ISDN circuit using PPP encapsulation.
- SanJose1 or SanJose2 should also be able to initiate a call to Westasman.
- ISP and SanJose2 are connected via a serial circuit using PPP encapsulation.
- SanJose2 and SanJose1 are connected via a serial circuit using PPP encapsulation with Challenge Handshake Authentication Protocol (CHAP) authentication.
- SanJose2 and ISP are running BGP.
- OSPF is the routing protocol between SanJose1 and SanJose2.

Notes

- You do not need to make changes to the ISP router.
- Connectivity and routing problems might be because of multiple issues on multiple routers. In other words, making a correct change on a router might solve one problem, but connectivity might still be an issue because of other problems with this or other routers.
- Be sure you have a reason for making every change. Making random or incorrect changes might introduce new problems to the scenario.
- Even though you might see the problem immediately using show running-config, use other show and debug commands to view the outputs. Some of these commands might include the following:
 - **show cdp neighbors**
 - **show ip ospf [neighbor | interface | database]**
 - **debug ip ospf [events | adj | packet]**
 - **show isdn active**
 - **show dialer**
 - **show ip route**
 - **show protocols**
 - **debug isdn events**
 - **debug ppp authentication**
 - **debug ip bgp events**
 - **clear ip bgp ***

Step 1

Cable the lab as shown in the figure.

Load the LabA-15SanJose1BrokenConfig.txt, LabA-15SanJose2BrokenConfig.txt, and LabA-15WestasmanBrokenConfig.txt configuration files. Load the working config for the ISP router: LabA-15ISPWorkingConfig.txt. (See detailed instructions in the introduction to Appendix A, "Supplemental Troubleshooting Labs and Case Studies," found in *CCNP 4: Network Troubleshooting Lab Companion*.)

Step 2

Verify the running configurations of all the routers with the “Broken” config files. For example, if you used a 1700 router instead of a 2600 router, be sure that your router has the same configuration information for FastEthernet 0 as the 2600 listing has for FastEthernet 0/0.

Make any necessary adjustments to your current running configurations.

Step 3

Troubleshoot and fix any problems.

List the problem, the commands you used to troubleshoot the problem, and the command you used to fix it.

ISP Router Configuration

```
! Case study 1 ISP-config.txt
! These configs are designed to create a desired result in a router
! for a troubleshooting exercise. They are not intended to represent
! a real working production lab configuration. Some commands will not
! work as entered. It is intended that this configuration will be used
! for all of this module's labs, so some of the entries and errors might
! not apply to every lab.
!
config t
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ISP
!
enable password cisco
!
!
!
!
ip subnet-zero
no ip domain-lookup
!
ip audit notify log
ip audit po max-events 100
!
!
process-max-time 200
!
interface Loopback0
 ip address 192.168.1.1 255.255.255.0
 no ip directed-broadcast
!
interface FastEthernet0/0
 no ip address
 no ip directed-broadcast
 shutdown
!
interface Serial0
 description connection to ITA SanJose2
 ip address 10.1.1.1 255.255.255.252
 no ip directed-broadcast
 encapsulation ppp
 no ip mroute-cache
 no fair-queue
 clockrate 125000
```

```
no shutdown
!
interface Serial0/0
description connection to ITA SanJose2
ip address 10.1.1.1 255.255.255.252
no ip directed-broadcast
encapsulation ppp
no ip mroute-cache
no fair-queue
clockrate 125000
no shutdown
!
interface Serial0/1
no ip address
no ip directed-broadcast
shutdown
!
router bgp 100
neighbor 10.1.1.2 remote-as 200
!
ip classless
ip http server
!
!
line con 0
transport input none
line aux 0
line vty 0 4
password cisco
login
!
!
```

SanJose1 Router Broken Config

```
!
!SanJose1 broken-config.txt
! These configs are designed to create a desired result in a router
! for a troubleshooting exercise. They are not intended to represent
! a real working production lab configuration. Some commands will not
! work as entered. It is intended that this configuration will be used
! for all of this module's labs, so some of the entries and errors might
! not apply to every lab.
!
config t
!
hostname SanJose1
!
enable password cisco
!
username Westasman password 0 cisco
username SanJose2 password 0 cisco
!
!
!
!
ip subnet-zero
no ip finger
no ip domain-lookup
!
isdn switch-type basic-ni
isdn voice-call-failure 0
!
!
!
interface Ethernet0
ip address 172.16.10.1 255.255.255.0
duplex auto
```

```
speed 100
no shutdown
!
interface FastEthernet0/0
ip address 172.16.10.1 255.255.255.0
duplex auto
speed 100
no shutdown
!
interface Serial0
description serial connection to SanJose2
ip unnumbered FastEthernet0/0
encapsulation ppp
no ip mroute-cache
no fair-queue
ppp authentication pap
ppp chap hostname ISP
no shutdown
!
interface Serial0/0
description serial connection to SanJose2
ip unnumbered FastEthernet0/0
encapsulation ppp
no ip mroute-cache
no fair-queue
ppp authentication pap
ppp chap hostname ISP
no shutdown
!
interface BRI0/0
no ip address
encapsulation ppp
dialer pool-member 2
isdn switch-type basic-ni
isdn spid1 5551234001
isdn spid2 5551235001
no shutdown
!
interface Serial1
no ip address
shutdown
!
interface Serial0/1
no ip address
shutdown
!
interface Dialer10
description connection to Westasman
ip address 172.16.130.1 255.255.255.252
encapsulation ppp
dialer remote-name Westasman
dialer string 5552000
dialer string 5552001
dialer pool 2
dialer load-threshold 5 either
dialer-group 1
ppp multilink
no shutdown
!
router ospf 1
redistribute connected subnets
redistribute static subnets
network 172.16.10.0 0.0.0.255 area 0
!
ip classless
ip route 172.16.128.0 255.255.255.0 172.16.130.2
no ip http server
```

```
!  
dialer-list 1 protocol ip permit  
!  
line con 0  
  exec-timeout 0 0  
  transport input none  
line aux 0  
line vty 0 4  
  exec-timeout 0 0  
  password cisco  
  login  
!  
no scheduler allocate  
end
```

SanJose2 Router Broken Config

```
! SanJose2 broken_config.txt  
! These configs are designed to create a desired result in a router  
! for a troubleshooting exercise. They are not intended to represent  
! a real working production lab configuration. Some commands will not  
! work as entered. It is intended that this configuration will be used  
! for all of this module's labs, so some of the entries and errors might  
! not apply to every lab.  
config t  
!  
!  
hostname SanJose2  
!  
enable password cisco  
!  
username SanJose1 password 0 cisco  
!  
!  
!  
memory-size iomem 10  
ip subnet-zero  
no ip finger  
no ip domain-lookup  
!  
ip audit notify log  
ip audit po max-events 100  
!  
!  
!  
process-max-time 200  
!  
interface Ethernet0  
ip address 172.16.5.1 255.255.255.0  
  no ip directed-broadcast  
  no shutdown  
!  
interface FastEthernet0/0  
  ip address 172.16.5.1 255.255.255.0  
  no ip directed-broadcast  
  no shutdown  
!  
interface Serial0  
description connection to ISP  
  ip address 10.1.1.2 255.255.255.252  
  no ip directed-broadcast  
  no ip mroute-cache  
  no fair-queue  
  no shutdown  
!  
interface Serial0/0  
  description connection to ISP
```

```
ip address 10.1.1.2 255.255.255.252
no ip directed-broadcast
no ip mroute-cache
no fair-queue
no shutdown
!
interface Serial1
description connection to SanJose1
ip unnumbered FastEthernet0/0
no ip directed-broadcast
encapsulation ppp
ppp authentication chap
ppp chap hostname SanJose2
no shutdown
!
interface Serial0/1
description connection to SanJose1
ip unnumbered FastEthernet0/0
no ip directed-broadcast
encapsulation ppp
ppp authentication chap
ppp chap hostname SanJose2
no shutdown
!
router ospf 1
network 172.16.0.0 0.0.127.255 area 0
default-information originate always
!
router bgp 300
neighbor 10.0.0.0 remote-as 200
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.1.1.1
no ip http server
!
!
line con 0
exec-timeout 0 0
transport input none
line aux 0
line vty 0 4
password cisco
login
!
!
end
```

Westasman Router Broken Config

```
!Westasman broken-config.txt
! These configs are designed to create a desired result in a router
! for a troubleshooting exercise. They are not intended to represent
! a real working production lab configuration. Some commands will not
! work as entered. It is intended that this configuration will be used
! for all of this module's labs, so some of the entries and errors might
! not apply to every lab.
config t
!
hostname Westasman
!
enable password cisco
!
username SanJose1 password 0 cisco
!
!
!
!
ip subnet-zero
```

```
no ip finger
no ip domain-lookup
!
ip audit notify log
ip audit po max-events 100
isdn switch-type basic-ni
!
!
!
process-max-time 200
!
interface Ethernet0
ip address 172.16.128.1 255.255.255.0
no ip directed-broadcast
speed 100
no shutdown
!
interface FastEthernet0/0
ip address 172.16.128.1 255.255.255.0
no ip directed-broadcast
speed 100
no shutdown
!
interface Serial0
no ip address
no ip directed-broadcast
no ip mroute-cache
shutdown
no fair-queue
!
interface Serial0/0
no ip address
no ip directed-broadcast
no ip mroute-cache
shutdown
no fair-queue
!
interface BRI0/0
description dial-up to SanJose1
no ip address
no ip directed-broadcast
encapsulation ppp
dialer pool-member 2
isdn switch-type basic-ni
isdn spid1 5554000001
isdn spid2 555400100
shutdown
!
interface Serial1
no ip address
no ip directed-broadcast
shutdown
!
interface Serial0/1
no ip address
no ip directed-broadcast
shutdown
!
interface Dialer10
description connection to SanJose1
ip address 172.16.130.2 255.255.255.252
no ip directed-broadcast
encapsulation ppp
dialer idle-timeout 30
dialer string 5551000
dialer string 5551001
dialer load-threshold 5 either
```



```

dialer-group 5
 ppp multilink
 no shutdown
 !
 !
 ip classless
 ip route 0.0.0.0 0.0.0.0 172.16.130.1
 no ip http server
 !
 dialer-list 1 protocol ip permit
 !
 line con 0
  exec-timeout 0 1
  transport input none
 line aux 0
 line vty 0 4
  password cisco
  login
 !
 !
 end

```

Correct Outputs

Following are some output examples that you should see when everything is configured correctly:

ISP>show ip route

```

Codes: C - connected, S - static, I - IGRP, 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

```

B    172.16.0.0/16 [20/0] via 10.1.1.2, 2d09h
     10.0.0.0/30 is subnetted, 1 subnets
C    10.1.1.0 is directly connected, Serial0/0
C    192.168.1.0/24 is directly connected, Loopback0

```

SanJose2#show ip route

```

Codes: C - connected, S - static, I - IGRP, 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 10.1.1.1 to network 0.0.0.0

```

     172.16.0.0/16 is variably subnetted, 5 subnets, 3 masks
O E2  172.16.128.0/24 [110/20] via 172.16.10.1, 00:23:32, Serial0/1
O E2  172.16.130.0/30 [110/20] via 172.16.10.1, 00:26:45, Serial0/1
O     172.16.10.0/24 [110/782] via 172.16.10.1, 00:28:46, Serial0/1
C     172.16.10.1/32 is directly connected, Serial0/1
C     172.16.5.0/24 is directly connected, FastEthernet0/0
     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C     10.1.1.0/30 is directly connected, Serial0/0
C     10.1.1.1/32 is directly connected, Serial0/0
S*   0.0.0.0/0 [1/0] via 10.1.1.1

```

SanJose2>show ip ospf

```

Routing Process "ospf 1" with ID 172.16.5.1
Supports only single TOS(TOS0) routes
It is an autonomous system boundary router
Redistributing External Routes from,
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
Number of external LSA 3. Checksum Sum 0x21A4D
Number of DCbitless external LSA 0
Number of DoNotAge external LSA 0
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
External flood list length 0
  Area BACKBONE(0)
    Number of interfaces in this area is 2
    Area has no authentication
    SPF algorithm executed 26 times
    Area ranges are
    Number of LSA 2. Checksum Sum 0x129BA
    Number of DCbitless LSA 0
    Number of indication LSA 0
    Number of DoNotAge LSA 0
    Flood list length 0

```

```
SanJose2>show ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address	Interface
172.16.11.1	1	FULL/ -	00:00:39	172.16.10.1	Serial0/1

```
SanJose1#show ip route
```

```

Codes: C - connected, S - static, I - IGRP, 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 172.16.5.1 to network 0.0.0.0
```

```

      172.16.0.0/16 is variably subnetted, 5 subnets, 3 masks
S       172.16.128.0/24 [1/0] via 172.16.130.2
C       172.16.130.0/30 is directly connected, Dialer10
C       172.16.10.0/24 is directly connected, FastEthernet0/0
C       172.16.5.1/32 is directly connected, Serial0/0
O       172.16.5.0/24 [110/782] via 172.16.5.1, 00:22:54, Serial0/0
O*E2 0.0.0.0/0 [110/1] via 172.16.5.1, 00:22:54, Serial0/0

```

```
SanJose1#show ip ospf
```

```

Routing Process "ospf 1" with ID 172.16.130.1
Supports only single TOS(TOS0) routes
Supports opaque LSA
It is an area border and autonomous system boundary router
Redistributing External Routes from,
  connected, includes subnets in redistribution
  static, includes subnets in redistribution
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
Number of external LSA 5. Checksum Sum 0x32B17
Number of opaque AS LSA 0. Checksum Sum 0x0
Number of DCbitless external and opaque AS LSA 0
Number of DoNotAge external and opaque AS LSA 0
Number of areas in this router is 2. 2 normal 0 stub 0 nssa
External flood list length 0
  Area BACKBONE(0)
    Number of interfaces in this area is 2
    Area has no authentication
    SPF algorithm executed 10 times
    Area ranges are
    Number of LSA 2. Checksum Sum 0xD089
    Number of opaque link LSA 0. Checksum Sum 0x0

```

```
Number of DCbitless LSA 0
Number of indication LSA 0
Number of DoNotAge LSA 0
Flood list length 0
Area 1
Number of interfaces in this area is 0
Area has no authentication
SPF algorithm executed 37 times
Area ranges are
Number of LSA 5. Checksum Sum 0x14771
Number of opaque link LSA 0. Checksum Sum 0x0
Number of DCbitless LSA 0
Number of indication LSA 0
Number of DoNotAge LSA 1
Flood list length 0

SanJose1#show interfaces
FastEthernet0/0 is up, line protocol is up
Hardware is AmdFE, address is 0002.4ba7.e820 (bia 0002.4ba7.e820)
Internet address is 172.16.10.1/24
MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
  reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
Full-duplex, 100Mb/s, 100BaseTX/FX
ARP type: ARPA, ARP Timeout 04:00:00
Last input 1d22h, output 00:00:04, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 1000 bits/sec, 1 packets/sec
  34 packets input, 7651 bytes
    Received 34 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog
    0 input packets with dribble condition detected
  52774 packets output, 3628668 bytes, 0 underruns
    0 output errors, 0 collisions, 11 interface resets
    0 babbles, 0 late collision, 1 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
Serial0/0 is up, line protocol is up
Hardware is PowerQUICC Serial
Description: serial connection to SanJose2
Interface is unnumbered. Using address of FastEthernet0/0 (172.16.10.1)
MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
  reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
LCP Open
Open: IPCP, CDPCP
Last input 00:00:01, output 00:00:01, output hang never
Last clearing of "show interface" counters 5d02h
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  139965 packets input, 6767888 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    23 input errors, 1 CRC, 22 frame, 0 overrun, 0 ignored, 0 abort
  140178 packets output, 6732827 bytes, 0 underruns
    0 output errors, 0 collisions, 87 interface resets
    0 output buffer failures, 0 output buffers swapped out
    103 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up
```

```
BRI0/0 is up, line protocol is up (spoofing)
Hardware is PQUICC BRI with U interface
MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec,
  reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Last input 00:00:00, output never, output hang never
Last clearing of "show interface" counters 5d02h
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/1000/64/0 (size/max total/threshold/drops)
  Conversations 0/1/16 (active/max active/max total)
  Reserved Conversations 0/0 (allocated/max allocated)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  87901 packets input, 352610 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  87871 packets output, 352252 bytes, 0 underruns
  0 output errors, 0 collisions, 1 interface resets
  0 output buffer failures, 0 output buffers swapped out
  1 carrier transitions
BRI0/0:1 is down, line protocol is down
Hardware is PQUICC BRI with U interface
MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec,
  reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
LCP Closed
Closed: CDPCP
Last input 1d21h, output 1d21h, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/1000/64/0 (size/max total/threshold/drops)
  Conversations 0/0/16 (active/max active/max total)
  Reserved Conversations 0/0 (allocated/max allocated)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  1497 packets input, 77387 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  1157 packets output, 59442 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  90 carrier transitions
BRI0/0:2 is down, line protocol is down
Hardware is PQUICC BRI with U interface
MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec,
  reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
LCP Closed
Closed: CDPCP
Last input never, output never, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/1000/64/0 (size/max total/threshold/drops)
  Conversations 0/0/16 (active/max active/max total)
  Reserved Conversations 0/0 (allocated/max allocated)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  0 packets input, 0 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  0 packets output, 0 bytes, 0 underruns
```

```

    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
Serial0/1 is administratively down, line protocol is down
Hardware is PowerQUICC Serial
MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set
Keepalive set (10 sec)
Last input never, output never, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/0/32 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
DCD=down DSR=down DTR=down RTS=down CTS=down

```

```

Dialer10 is up (spoofing), line protocol is up (spoofing)
Hardware is Unknown
Description: connection to Westasman
Internet address is 172.16.130.1/30
MTU 1500 bytes, BW 56 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
DTR is pulsed for 1 seconds on reset
Last input 1d21h, output never, output hang never
Last clearing of "show interface" counters 5d02h
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/16 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
    519 packets input, 38507 bytes
    471 packets output, 46563 bytes

```

SanJose1#ping 192.168.1.1

```

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/28/32 ms

```

Westasman#ping 192.168.1.1

```

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:

5d02h: BRI0/0 DDR: rotor dialout [priority]
5d02h: BRI0/0 DDR: Dialing cause ip (s=172.16.130.2, d=192.168.1.1)
5d02h: BRI0/0 DDR: Attempting to dial 5551000
5d02h: %LINK-3-UPDOWN: Interface BRI0/0:1, changed state to up
5d02h: %DIALER-6-BIND: Interface BRI0/0:1 bound to profile Dialer10
5d02h: %ISDN-6-CONNECT: Interface BRI0/0:1 is now connected to 5551000

```

```

5d02h: isdn_call_connect: Calling lineaction of BRI0/0:1
5d02h: BR0/0:1 PPP: Treating connection as a callout.
5d02h: BR0/0:1 PPP: Phase is AUTHENTICATING, by the peer
5d02h: BR0/0:1 CHAP: I CHALLENGE id 32 len 29 from "SanJose1"
5d02h: BR0/0:1 CHAP: O RESPONSE id 32 len 30 from "Westasman"
5d02h: BR0/0:1 CHAP: I SUCCESS id 32 len 4
5d02h: Di10 DDR: Dialer protocol up
5d02h: Dialer10 DDR: dialer protocol up
5d02h: Dialer10: dialer_ckt_sw_t_client_connect: incoming circuit switched call.!
!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 60/60/60 ms
Westasman#
5d02h: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0/0:1, changed state
to up
Westasman#
5d02h: %ISDN-6-CONNECT: Interface BRI0/0:1 is now connected to 5551000 SanJose1

```

```
Westasman#show isdn active
```

```
-----
                          ISDN ACTIVE CALLS
-----
```

```
History table has a maximum of 100 entries.
History table data is retained for a maximum of 15 Minutes.
-----
```

Call Type	Calling Number	Called Number	Remote Name	Seconds Used	Seconds Left	Seconds Idle	Charges Units/Currency
-----------	----------------	---------------	-------------	--------------	--------------	--------------	------------------------

```
-----
Out                5551000      SanJose1      116                0      0
-----
```

```
Westasman#show cdp neighbor
```

```
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater
```

Device ID	Local Intrfce	Holdtme	Capability	Platform	Port ID
SanJose1	Dialer10	151	R	2620	Dialer10
0050BD79D600	Fas 0/0	124	T S	1900	B

```
Westasman#show ip route
```

```
Codes: C - connected, S - static, I - IGRP, 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 172.16.130.1 to network 0.0.0.0
```

```

      172.16.0.0/16 is variably subnetted, 3 subnets, 3 masks
C       172.16.128.0/24 is directly connected, FastEthernet0/0
C       172.16.130.0/30 is directly connected, Dialer10
C       172.16.130.1/32 is directly connected, Dialer10
S*    0.0.0.0/0 [1/0] via 172.16.130.1

```

Case Study 1: Errors in Configurations

You should have identified and corrected the errors that appear in Table 1-1.

Table 1-1 Configuration Errors

Problems to Be Corrected	
1	Incorrect BGP AS and Remote-as numbers/redistribute OSPF
2	Incorrect “dialer-group” configuration
3	ISDN call setup failure—incorrect service profile identifiers (SPIDs) configured on two routers
4	Incorrect PPP authentication
5	Incorrect PPP chap host name
6	Interface administratively down
7	Exec-timeout
8	Incorrect encapsulation on a serial interface
9	Clock rate not specified
10	Missing “dialer pool #” command on dialer interface
11	Interface administratively shut down
12	Missing dialer remote-name

ISP

This configuration has no errors.

SanJose2

Problem 1

Replace

```
router bgp 300
 neighbor 10.0.0.0 remote-as 200
```

with

```
router bgp 200
 bgp log-neighbor-changes
 redistribute ospf 1
 neighbor 10.1.1.1 remote-as 100
```

Problem 8

Replace

```
interface Serial0/0
 encapsulation hdlc (default-does not show in output of show running-config)
```

with

```
interface Serial0/0
 encapsulation ppp
```

Problem 9

Replace

```
interface Serial0/1
  <missing clock rate>
```

with

```
interface Serial0/1
  clockrate 125000
```

SanJose1

Problem 4

Replace

```
interface Serial0/0
  ppp authentication pap
```

with

```
interface Serial0/0
  ppp authentication chap
```

Problem 5

Replace

```
interface Serial0/0
  ppp chap hostname ISP
```

with

```
interface Serial0/0
  ppp chap hostname SanJose1
```

Problem 3

Replace

```
interface BRI0/0
  isdn spid1 5551234001
  isdn spid2 5551235001
```

with

```
interface BRI0/0
  isdn spid1 51055510000001 5551000
  isdn spid2 51055510010001 5551001
```

Westasman

Problem 2

Replace

```
interface Dialer10
  dialer-group 5
```

with

```
interface Dialer10
  dialer-group 1
```


Problem 3

Replace

```
interface BRI0/0
 isdn spid1 55540000001
 isdn spid2 5554001000
```

with

```
interface BRI0/0
 isdn spid1 51055520000001 5552000
 isdn spid2 51055520010001 5552001
```

Problem 10

Replace

```
interface Dialer10
 <missing "dialer pool 2">
```

with

```
interface Dialer10
 dialer pool 2
```

Problem 7

Replace

```
line con 0
 exec-timeout 0 1
```

with

```
line con 0
 exec-timeout 0 0 (or a longer period such as exec-timeout 90 0)
```

Problem 11

Replace

```
interface BRI0/0
 shutdown
```

with

```
interface BRI0/0
 no shutdown
```

Problem 12

Replace

```
interface dialer 10
 <missing remote-name>
```

with

```
interface dialer 10
 dialer remote-name SanJose1
```

Final Router Configurations

ISP Router Configuration

```
ISP#show running-config
! Case study 1 ISP-config.txt
! These configs are designed to create a desired result in a router
! for a troubleshooting exercise. They are not intended to represent
! a real working production lab configuration. Some commands will not
! work as entered. It is intended that this configuration will be used
! for all of this module's labs, so some of the entries and errors might
! not apply to every lab.
```

Current configuration:

```
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ISP
!
enable password cisco
!
!
!
!
ip subnet-zero
no ip domain-lookup
!
ip audit notify log
ip audit po max-events 100
!
!
!
process-max-time 200
!
interface Loopback0
 ip address 192.168.1.1 255.255.255.0
 no ip directed-broadcast
!
interface FastEthernet0/0
 no ip address
 no ip directed-broadcast
 shutdown
!
interface Serial0/0
 description connection to ITA SanJose2
 ip address 10.1.1.1 255.255.255.252
 no ip directed-broadcast
 encapsulation ppp
 no ip mroute-cache
 no fair-queue
 clockrate 125000
 no shutdown
!
interface Serial0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
router bgp 100
 neighbor 10.1.1.2 remote-as 200
!
ip classless
```

```
ip http server
!
!
line con 0
  transport input none
line aux 0
line vty 0 4
  password cisco
  login
!
!
end
```

SanJose1 Router Configuration

```
SanJose1#show running-config
Building configuration...
```

Current configuration:

```
!
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname SanJose1
!
enable password cisco
!
username Westasman password 0 cisco
username SanJose2 password 0 cisco
!
!
!
!
ip subnet-zero
no ip finger
no ip domain-lookup
!
isdn switch-type basic-ni
isdn voice-call-failure 0
!
!
!
interface FastEthernet0/0
  ip address 172.16.10.1 255.255.255.0
  duplex auto
  speed 100
!
interface Serial0/0
  description serial connection to SanJose2
  ip unnumbered FastEthernet0/0
  encapsulation ppp
  no ip mroute-cache
  no fair-queue
  ppp authentication chap
  ppp chap hostname SanJose1
!
interface BRI0/0
  no ip address
  encapsulation ppp
  dialer pool-member 2
  isdn switch-type basic-ni
  isdn spid1 51055510000001 5551000
  isdn spid2 51055510010001 5551001
!
interface Serial0/1
```

```
no ip address
shutdown
!
interface Dialer10
description connection to Westasman
ip address 172.16.130.1 255.255.255.252
encapsulation ppp
dialer remote-name Westasman
dialer pool 2
dialer idle-timeout 30
dialer string 5552000
dialer string 5552001
dialer load-threshold 5 either
dialer-group 1
ppp authentication chap
ppp multilink
!
router ospf 1
redistribute connected subnets
redistribute static subnets
network 172.16.10.0 0.0.0.255 area 0
!
ip classless
ip route 172.16.128.0 255.255.255.0 172.16.130.2
no ip http server
!
dialer-list 1 protocol ip permit
!
line con 0
exec-timeout 0 0
transport input none
line aux 0
line vty 0 4
exec-timeout 0 0
password cisco
login
!
no scheduler allocate
end
```

SanJose2 Router Configuration

```
SanJose2#show running-config
Building configuration...
```

```
Current configuration:
```

```
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname SanJose2
!
enable password cisco
!
username SanJose1 password 0 cisco
!
!
!
!
memory-size iomem 10
ip subnet-zero
no ip finger
no ip domain-lookup
!
ip audit notify log
```

```
ip audit po max-events 100
!
!
!
process-max-time 200
!
interface FastEthernet0/0
 ip address 172.16.5.1 255.255.255.0
 no ip directed-broadcast
 no shutdown
!
interface Serial0/0
 description connection to ISP
 ip address 10.1.1.2 255.255.255.252
 no ip directed-broadcast
 encapsulation ppp
 no ip mroute-cache
 no fair-queue
 no shutdown
!
interface Serial0/1
 description connection to SanJose1
 ip unnumbered FastEthernet0/0
 no ip directed-broadcast
 encapsulation ppp
 clockrate 125000
 ppp authentication chap
 ppp chap hostname SanJose2
 no shutdown
!
router ospf 1
 network 172.16.0.0 0.0.127.255 area 0
 default-information originate always
!
router bgp 200
 bgp log-neighbor-changes
 redistribute ospf 1
 neighbor 10.1.1.1 remote-as 100
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.1.1.1
no ip http server
!
!
line con 0
 exec-timeout 0 0
 transport input none
line aux 0
line vty 0 4
 password cisco
 login
!
!
end
```

Westasman Router Configuration

```
Westasman# show running-config
Building configuration...
```

```
Current configuration:
```

```
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
```

```
hostname Westasman
!
enable password cisco
!
username SanJose1 password 0 cisco
!
!
!
!
ip subnet-zero
no ip finger
no ip domain-lookup
!
ip audit notify log
ip audit po max-events 100
isdn switch-type basic-ni
!
!
!
process-max-time 200
!
interface FastEthernet0/0
 ip address 172.16.128.1 255.255.255.0
 no ip directed-broadcast
 speed 100
!
interface Serial0/0
 no ip address
 no ip directed-broadcast
 no ip mroute-cache
 shutdown
 no fair-queue
!
interface BRI0/0
 description dial-up to SanJose1
 no ip address
 no ip directed-broadcast
 encapsulation ppp
 dialer pool-member 2
 isdn switch-type basic-ni
 isdn spid1 51055520000001 5552000
 isdn spid2 51055520010001 5552001
!
interface Serial0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
interface Dialer10
 description connection to SanJose1
 ip address 172.16.130.2 255.255.255.252
 no ip directed-broadcast
 encapsulation ppp
 dialer remote-name SanJose1
 dialer idle-timeout 30
 dialer string 5551000
 dialer string 5551001
 dialer pool 2
 dialer-group 1
 ppp authentication chap
 ppp multilink
!
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.130.1
no ip http server
!
dialer-list 1 protocol ip permit
```

```
!  
line con 0  
  exec-timeout 0 0  
  transport input none  
line aux 0  
line vty 0 4  
  password cisco  
  login  
!  
!  
end
```