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Let's go

The bridge to possible

CCNP Enterprise Hands-On Troubleshooting

v2.0

Patrick Gargano, Lead Content Advocate
@PatrickGargano

John Capobianco, Solutions Engineer Technical Lead
@John_Capobianco

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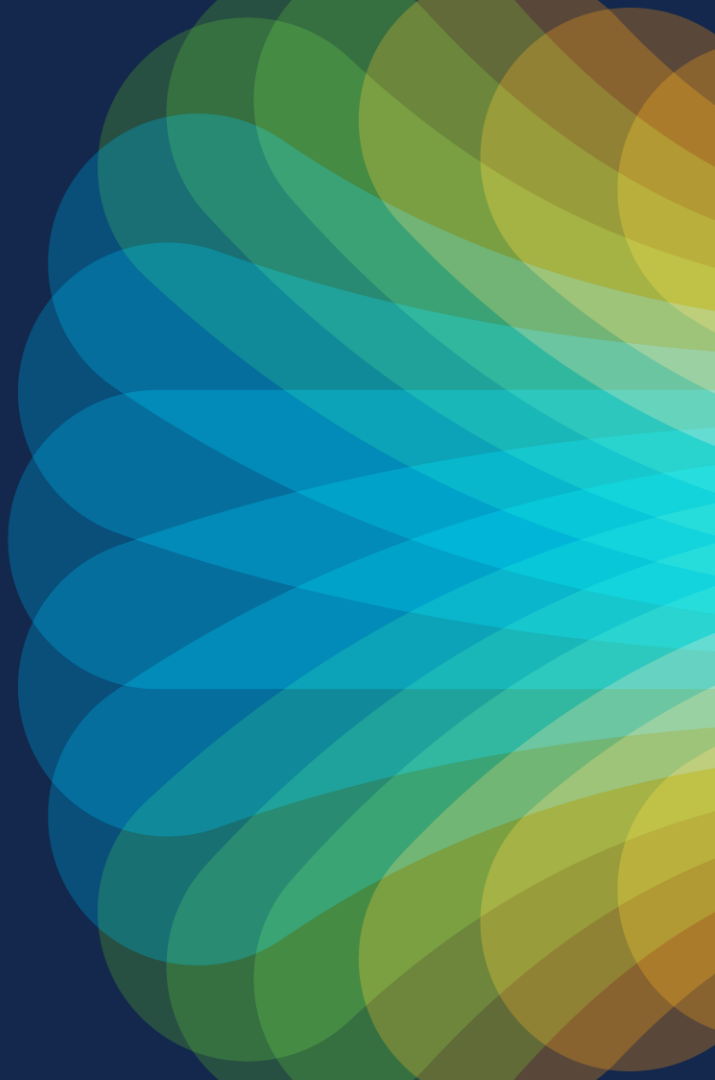
LTRCRT-2002

Agenda

- Introduction
- Lab Setup
- Troubleshooting Challenge
- Cisco Press Prizes
- Conclusion

Introduction



Presenters

Patrick Gargano

- Lead Content Advocate with Learning & Certifications
- CCSI
- Cisco Networking Academy Instructor
- CCNP Enterprise/SD-WAN/Adv Routing/Multicloud
- CCNA CyberOps
- Cisco Press Author
- Distinguished Speaker

John Capobianco

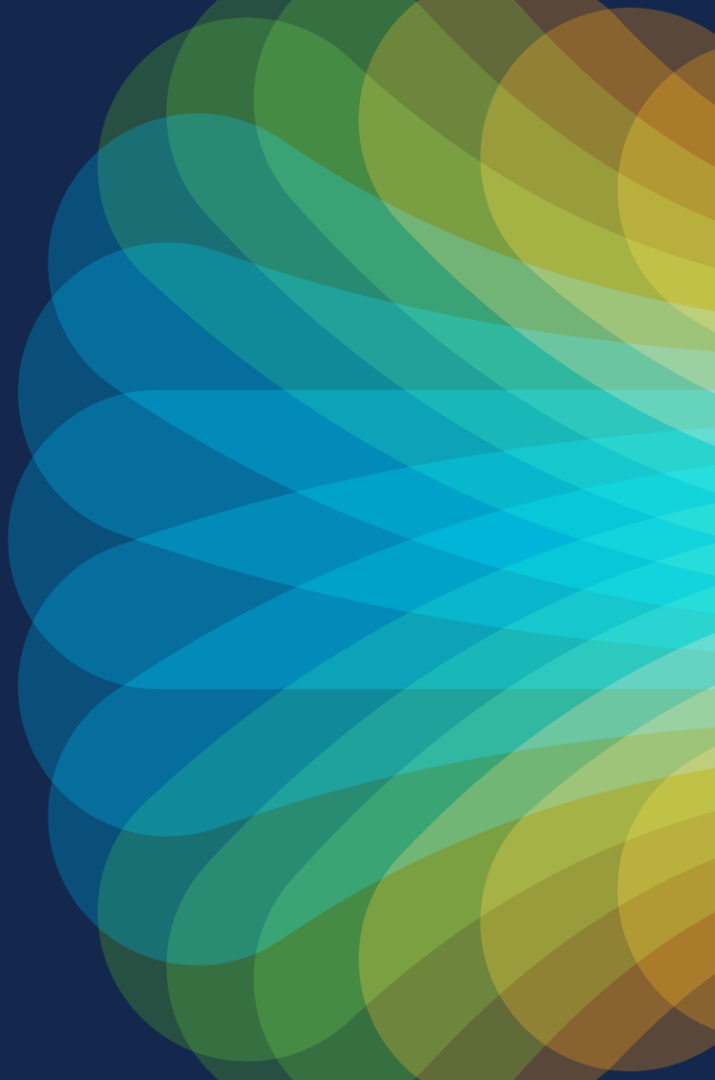
- Solutions Engineer Technical Lead Artificial Intelligence
- Training Bootcamp Instructor and CCSI
- CCNP Enterprise, Data Center
- Cisco DevNet Associate
- Cisco Press Author
- Distinguished Speaker

Housekeeping

- Restrooms
- Breaks – at your discretion
- Drinks
- Session Survey

This session will
make you stronger at
troubleshooting network issues.

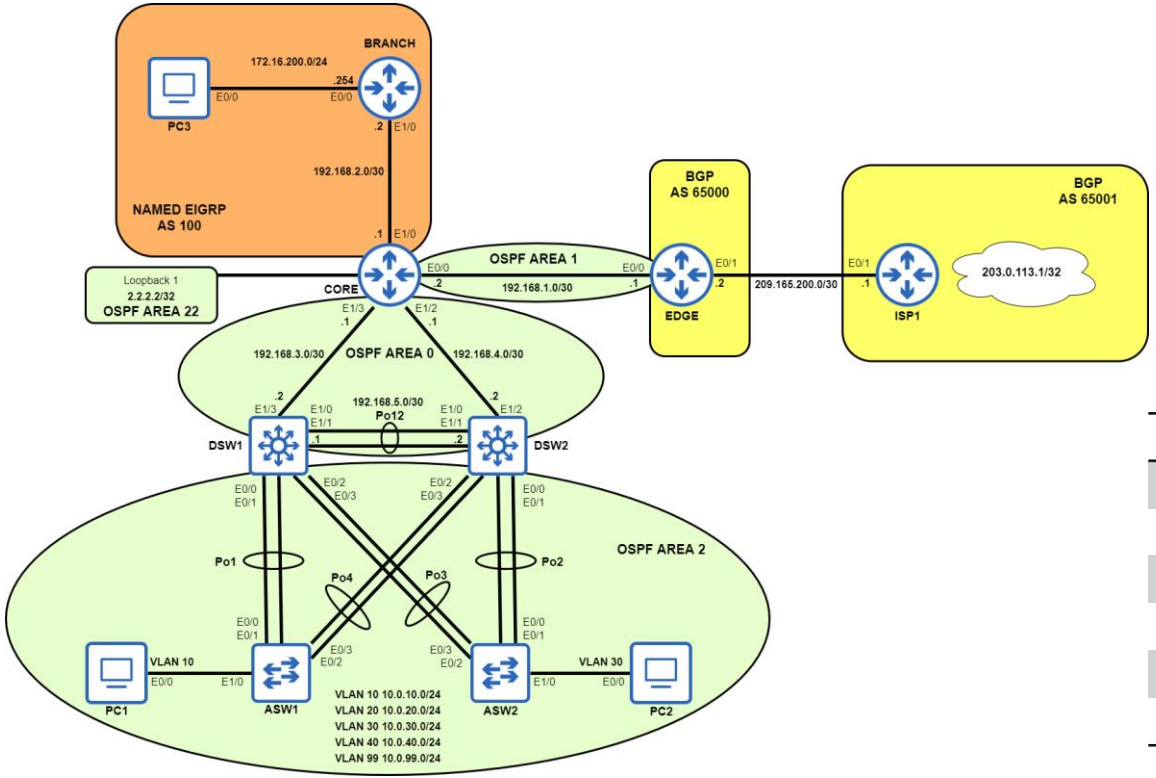
Lab Setup



Lab Overview

- 27 Trouble Tickets
- Like the legacy CCNP TSHOOT exam labs
  - Scenario-based
  - Issue has been logged
  - Confirm issue
  - Troubleshoot and fix
  - Document solution on answer sheet
  - Get answer validated by proctor or request a hint
- Stick around until the end for Cisco Press giveaways!

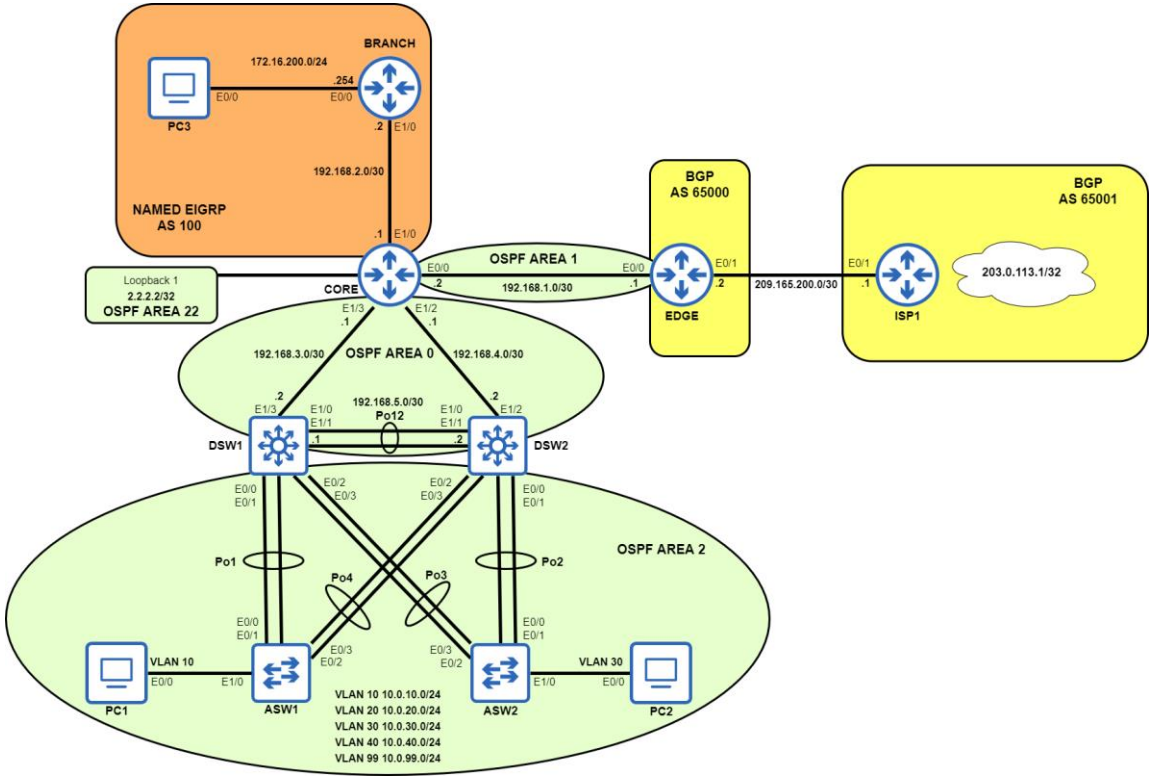
Lab Topology – IPv4 (Tickets 1-21)



RSTP		
VLAN	DSW1	DSW2
10	Root	Backup root
20	Root	Backup root
30	Backup root	Root
40	Backup root	Root
99	Root	Backup root

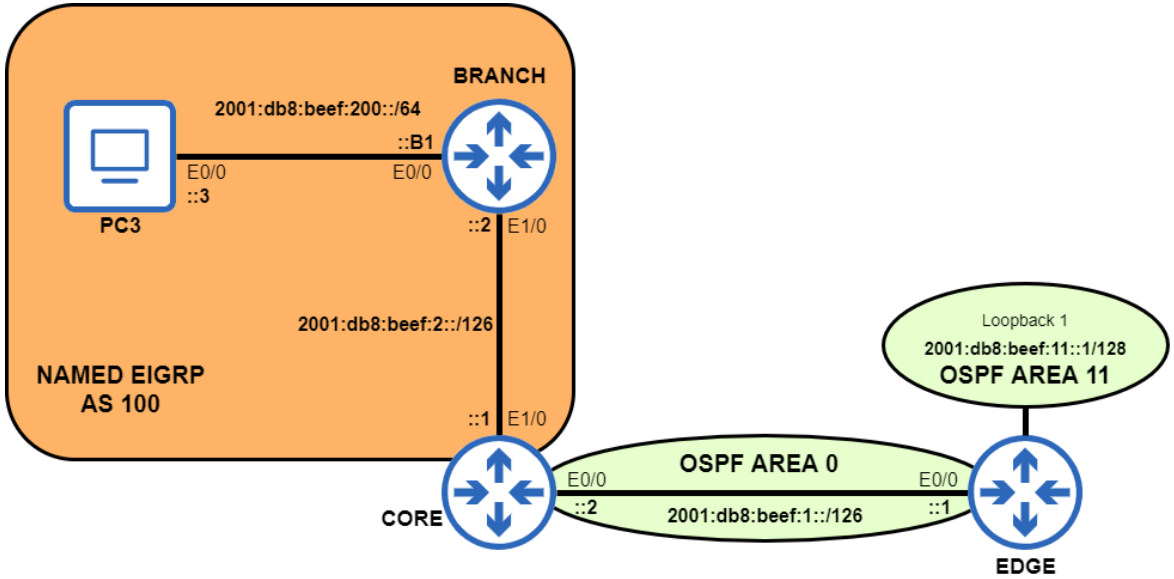
HSRPv2			
VLAN	DSW1	DSW2	Virtual IP
10	Active	Standby	10.0.10.254
20	Active	Standby	10.0.20.254
30	Standby	Active	10.0.30.254
40	Standby	Active	10.0.40.254
99	Active	Standby	10.0.99.254

Lab Topology – IPv4 (Tickets 1-21)

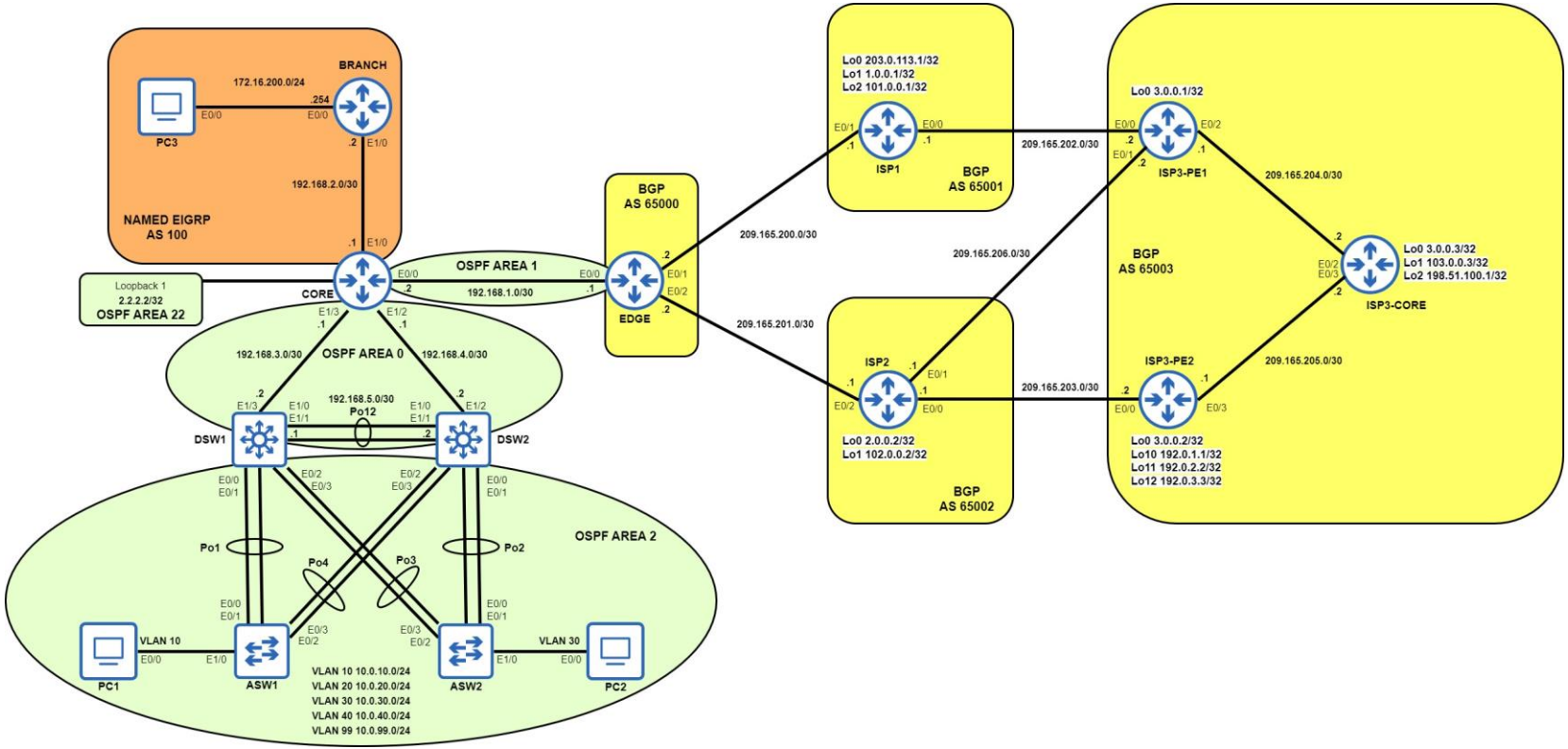


DHCP		
CORE (relay agent 2.2.2.2)		
VLAN	Subnet	Gateway
10	10.0.10.0/24	10.0.10.254
20	10.0.20.0/24	10.0.20.254
30	10.0.30.0/24	10.0.30.254
40	10.0.40.0/24	10.0.40.254
BRANCH		
--	172.16.200.0/24	172.16.200.254

Lab Topology – IPv6 (Tickets 1-21)

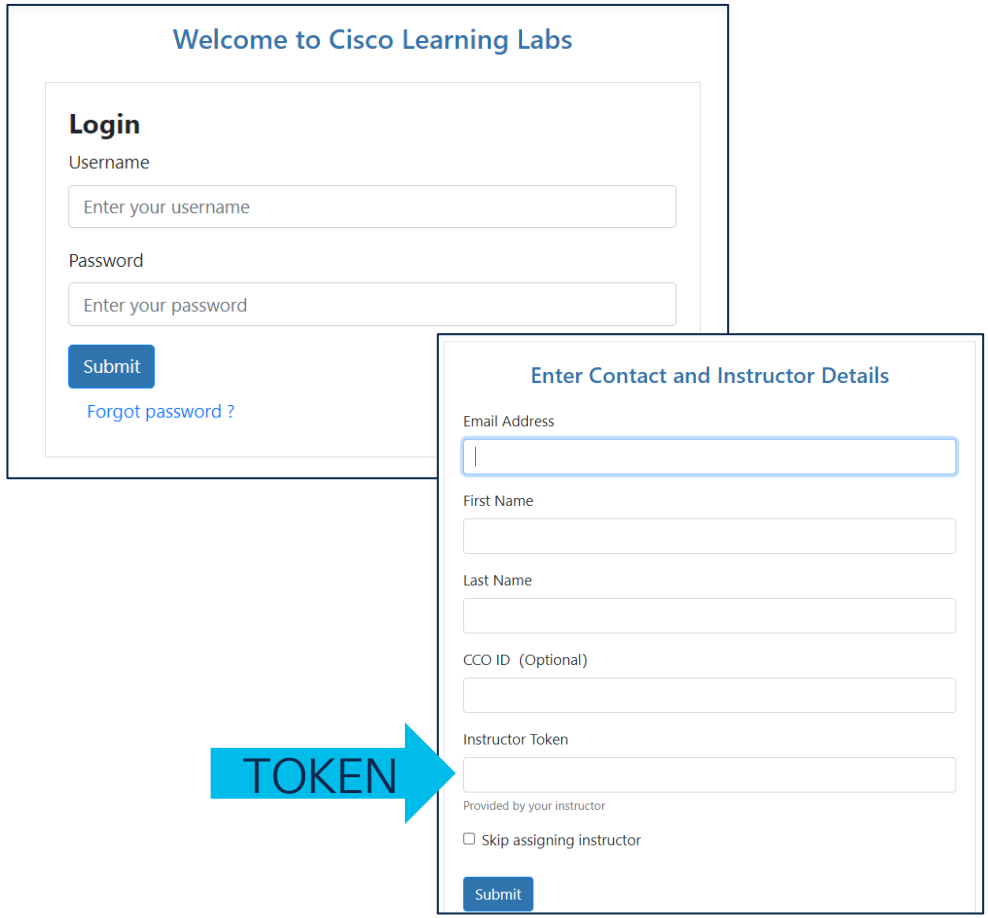


Advanced BGP Tickets (22 to 27)

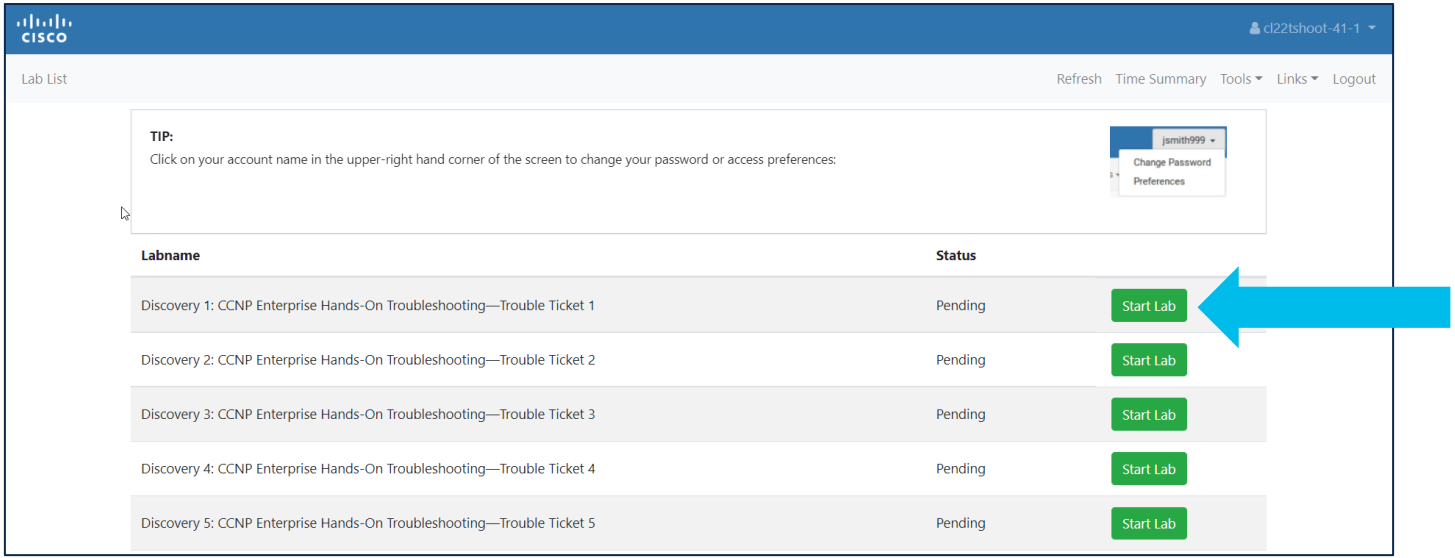


Steps to Login

- https://cll-ng.cisco.com
- Credentials
- Instructor Token: **peber**
- Click OK in the instructor popup.

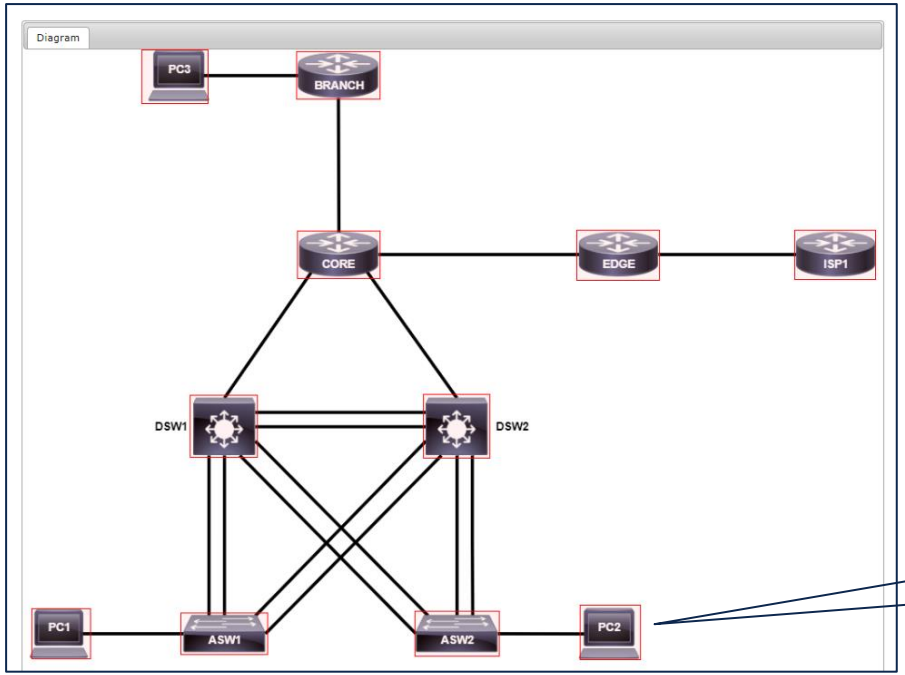


Lab Portal



Lab Environment

Introduction Guidelines Job Aid Trouble Ticket 1 Manage Devices Help & Settings Exit

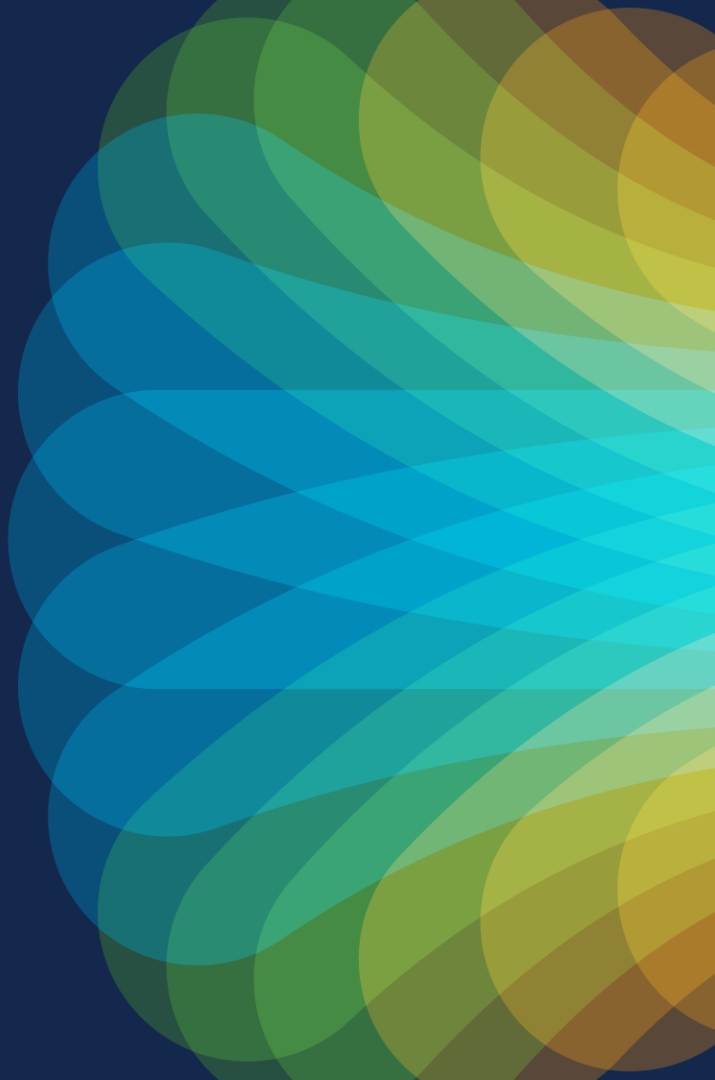


Note:
Introduction, Guidelines, and Job Aid are identical across all tickets.

Enable secret password: **cisco**

PCs are running IOS router image
`no ip routing`
`ip default-gateway`

Troubleshooting Challenge



Trouble Ticket #1

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1 cannot ping 203.0.113.1.

Trouble Ticket #2

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC3 cannot ping 203.0.113.1.

Trouble Ticket #3

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC2 cannot ping 203.0.113.1.

Trouble Ticket #4

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1 is taking a suboptimal path to reach 203.0.113.1.
- Fix the problem so that you can achieve the same output below:

```
PC1# traceroute 203.0.113.1
Type escape sequence to abort.
Tracing the route to 203.0.113.1
VRF info: (vrf in name/id, vrf out name/id)
  1 10.0.10.252 3 msec 4 msec 6 msec
  2 192.168.3.1 1 msec 1 msec 1 msec
  3 192.168.1.1 1 msec 1 msec 1 msec
  4 209.165.200.1 2 msec *  2 msec
```

Trouble Ticket #5

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1 and PC2 cannot reach 203.0.113.1.
- Fix the problem so that you can achieve the same output below:

```
PC1# traceroute 203.0.113.1
Type escape sequence to abort.
Tracing the route to 203.0.113.1
VRF info: (vrf in name/id, vrf out name/id)
  1 10.0.10.252 3 msec 4 msec 6 msec
  2 192.168.3.1 1 msec 1 msec 1 msec
  3 192.168.1.1 1 msec 1 msec 1 msec
  4 209.165.200.1 2 msec *  2 msec
```

```
PC2# traceroute 203.0.113.1
Type escape sequence to abort.
Tracing the route to 203.0.113.1
VRF info: (vrf in name/id, vrf out name/id)
1 10.0.30.253 9 msec 1 msec 1 msec
2 192.168.4.1 1 msec 1 msec 1 msec
3 192.168.1.1 1 msec 1 msec 1 msec
4 209.165.200.1 2 msec *  2 msec
```

Trouble Ticket #6

- Network requirements state that PC1 should be able to Telnet to all switches.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1 could no longer Telnet to all switches.
- Fix the problem so that you can achieve the same output below:

```
PC1# telnet 10.0.99.250
Trying 10.0.99.250 ... Open

User Access Verification

Username: admin
Password:

ASW2>
```

```
PC1# telnet 10.0.99.251
Trying 10.0.99.251 ... Open

User Access Verification

Username: admin
Password:

ASW2>
```

```
PC1# telnet 10.0.99.252
Trying 10.0.99.252 ... Open

User Access Verification

Username: admin
Password:

DSW1>
```

```
PC1# telnet 10.0.99.253
Trying 10.0.99.253 .. Open

User Access Verification

Username: admin
Password:

DSW2>
```

Trouble Ticket #7

- Network requirements state that PC1 should be able to use TFTP to copy the startup config file from all switches.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1 could no longer copy the startup-config file from all switches.
- Fix the problem so that you can achieve the same output below:

```
PC1# copy tftp://10.0.99.250/startup-config null:
Accessing tftp://10.0.99.250/startup-config...
Loading startup-config from 10.0.99.250 (via Ethernet0/0): !
[OK - 3494 bytes]

3494 bytes copied in 0.116 secs (30121 bytes/sec)

PC1# copy tftp://10.0.99.251/startup-config null:
Accessing tftp://10.0.99.251/startup-config...
Loading startup-config from 10.0.99.251 (via Ethernet0/0): !
[OK - 3536 bytes]

3536 bytes copied in 0.100 secs (35360 bytes/sec)
```

```
PC1# copy tftp://10.0.99.252/startup-config null:
Accessing tftp://10.0.99.252/startup-config...
Loading startup-config from 10.0.99.252 (via Ethernet0/0): !
[OK - 4719 bytes]

4719 bytes copied in 0.153 secs (30843 bytes/sec)

PC1# copy tftp://10.0.99.253/startup-config null:
Accessing tftp://10.0.99.253/startup-config...
Loading startup-config from 10.0.99.253 (via Ethernet0/0): !
[OK - 4670 bytes]

4670 bytes copied in 0.160 secs (29188 bytes/sec)
```

Trouble Ticket #8

- Network requirements state that PC2 should have access to the public address 203.0.113.1 via its default gateway DSW2.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that the PC2 default gateway alternates intermittently between DSW1 and DSW2, as shown below (output may vary):

```
PC2# traceroute 203.0.113.1
Type escape sequence to abort.
Tracing the route to 203.0.113.1
VRF info: (vrf in name/id, vrf out name/id)
1 10.0.30.252 3 msec 8 msec 1 msec
2 192.168.3.1 1 msec 1 msec 1 msec
3 192.168.1.1 1 msec 1 msec 1 msec
4 209.165.200.1 2 msec *  2 msec
```

```
PC2# traceroute 203.0.113.1
Type escape sequence to abort.
Tracing the route to 203.0.113.1
VRF info: (vrf in name/id, vrf out name/id)
1 10.0.30.253 4 msec 6 msec 11 msec
2 192.168.4.1 1 msec 1 msec 1 msec
3 192.168.1.1 1 msec 1 msec 1 msec
4 209.165.200.1 1 msec *  2 msec
```

- Fix the problem so that you can consistently achieve the output shown on the right.

Trouble Ticket #9

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC2 cannot ping 203.0.113.1.

Trouble Ticket #10

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1 cannot ping 203.0.113.1.

Trouble Ticket #11

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC3 cannot ping 203.0.113.1.

Trouble Ticket #12

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1 and PC2 cannot ping 203.0.113.1.

Trouble Ticket #13

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1, PC2 and PC3 cannot ping 203.0.113.1.

Trouble Ticket #14

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC3 cannot ping 203.0.113.1.

Trouble Ticket #15

- **NOTE: Please let proctor know when you start this ticket.**
- Network requirements state that PC3 should have access to all OSPF IPv6 prefixes.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC3 cannot ping all OSPF IPv6 prefixes.
- Fix the problem so that you can achieve the same output below:

```
PC3# ping 2001:db8:beef:1::1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:BEEF:1::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/8/37 ms

PC3# ping 2001:db8:beef:1::2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:BEEF:1::2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

```
PC3# ping 2001:db8:beef:11::1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:BEEF:11::1,
timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5),
round-trip min/avg/max = 1/1/1 ms
PC3#
```

Trouble Ticket #16

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1, PC2, and PC3 cannot ping 203.0.113.1.

Trouble Ticket #17

- Network requirements specify clear IPv4 and IPv6 routing protocol boundaries.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that the routing boundary on CORE is no longer being observed.
- Fix the problem so that you can achieve the same output below:

```
CORE# show ospfv3 interface brief
Interface    PID   Area            AF          Cost  State Nbrs F/C
Et0/0        1     0               ipv6        1000  DR    1/1

CORE# show ipv6 eigrp interfaces
EIGRP-IPv6 VR(EXAM) Address-Family Interfaces for AS(100)
                              Xmit Queue   PeerQ        Mean   Pacing Time   Multicast    Pending
Interface              Peers  Un/Reliable  Un/Reliable  SRTT   Un/Reliable   Flow Timer   Routes
Et1/0                    1        0/0       0/0          6       0/2           50           0
```

Trouble Ticket #18

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC2 cannot ping 203.0.113.1.

Trouble Ticket #19

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC3 cannot ping 203.0.113.1.

Trouble Ticket #20

- Network requirements specify that static routing to 203.0.113.1/32 is configured on BRANCH.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that static routing to 203.0.113.1/32 configured on BRANCH is no longer functional.
- Fix the problem so that you can achieve the same output below:

```
BRANCH# show ip route
Gateway of last resort is 192.168.2.1 to network 0.0.0.0
D*EX  0.0.0.0/0 [170/1536000] via 192.168.2.1, 00:20:12, Ethernet1/0
      172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C        172.16.200.0/24 is directly connected, Ethernet0/0
L        172.16.200.254/32 is directly connected, Ethernet0/0
      192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.2.0/30 is directly connected, Ethernet1/0
L        192.168.2.2/32 is directly connected, Ethernet1/0
      203.0.113.0/32 is subnetted, 1 subnets
S        203.0.113.1 [1/0] via 192.168.2.1
```

Trouble Ticket #21

- Network requirements state that all PCs should have access to the public address 203.0.113.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1, PC2, and PC3 cannot ping 203.0.113.1

Trouble Ticket #22 – Advanced BGP Ticket

- Network requirements state that all PCs should have access to the public address 198.51.100.1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1, PC2, and PC3 cannot ping 198.51.100.1.

Trouble Ticket #23 – Advanced BGP Ticket

- Network requirements state that ISP1 and IPS2 routers should not learn prefixes from AS 65000.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that ISP1 and ISP2 routers are learning prefixes from AS 65000.
- Fix the problem so that you can achieve the same output below:

```
ISP1# show ip bgp summary
Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
209.165.200.2   4        65000       8       13       10    0    0 00:05:09        0
209.165.202.2   4        65003      31       36       10    0    0 00:23:36        6

ISP2# show ip bgp summary
Neighbor        V           AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
209.165.201.2   4        65000       9       15       13    0    0 00:06:08        0
209.165.203.2   4        65003      31       38       13    0    0 00:24:33        7
209.165.206.2   4        65003      31       33       13    0    0 00:24:36        7
```

Trouble Ticket #24 – Advanced BGP Ticket

- Network requirements state that all PCs should have access to the public address 198.51.100.1 via ISP1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PCs are using ISP2 to reach 198.51.100.1.
- Fix the problem so that you can achieve the same output below:

```
PC1# traceroute 198.51.100.1
Type escape sequence to abort.
Tracing the route to 198.51.100.1
VRF info: (vrf in name/id, vrf out name/id)
  1 10.0.10.252 1002 msec 0 msec 1 msec
  2 192.168.3.1 2 msec 2 msec 0 msec
  3 192.168.1.1 1 msec 0 msec 1 msec
  4 209.165.200.1 1 msec 1 msec 0 msec
  5 209.165.202.2 1 msec 1 msec 1 msec
  6 209.165.204.2 1 msec 0 msec 1 msec
```

```
PC2# traceroute 198.51.100.1
Type escape sequence to abort.
Tracing the route to 198.51.100.1
VRF info: (vrf in name/id, vrf out name/id)
  1 10.0.30.253 1002 msec 1 msec 1 msec
  2 192.168.4.1 1 msec 1 msec 0 msec
  3 192.168.1.1 1 msec 1 msec 1 msec
  4 209.165.200.1 1 msec 1 msec 2 msec
  5 209.165.202.2 2 msec 1 msec 1 msec
  6 209.165.204.2 2 msec 1 msec 1 msec
```

```
PC3# traceroute 198.51.100.1
Type escape sequence to abort.
Tracing the route to 198.51.100.1
VRF info: (vrf in name/id, vrf out name/id)
  1 172.16.200.254 1001 msec 1 msec 0 msec
  2 192.168.2.1 1 msec 1 msec 1 msec
  3 192.168.1.1 1 msec 1 msec 0 msec
  4 209.165.200.1 1 msec 1 msec 1 msec
  5 209.165.202.2 1 msec 1 msec 1 msec
  6 209.165.204.2 0 msec 1 msec 0 msec
```

Trouble Ticket #25 – Advanced BGP Ticket

- Network requirements state that all PCs should have access to the public address 2.0.0.2 directly via ISP2.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that PC1, PC2, and PC3 are using a suboptimal path to reach 2.0.0.2.
- Fix the problem so that you can achieve the same output below:

```
PC1# traceroute 2.0.0.2
Type escape sequence to abort.
Tracing the route to 2.0.0.2
VRF info: (vrf in name/id, vrf out name/id)
  1 10.0.10.252 1 msec 0 msec 0 msec
  2 192.168.3.1 1 msec 1 msec 0 msec
  3 192.168.1.1 1 msec 1 msec 0 msec
  4 209.165.201.1 1 msec 1 msec 0 msec
```

```
PC2# traceroute 2.0.0.2
Type escape sequence to abort.
Tracing the route to 2.0.0.2
VRF info: (vrf in name/id, vrf out name/id)
  1 10.0.30.253 0 msec 0 msec 1 msec
  2 192.168.4.1 0 msec 1 msec 0 msec
  3 192.168.1.1 1 msec 1 msec 0 msec
  4 209.165.201.1 2 msec 2 msec 1 msec
```

```
PC3# traceroute 2.0.0.2
Type escape sequence to abort.
Tracing the route to 2.0.0.2
VRF info: (vrf in name/id, vrf out name/id)
  1 172.16.200.254 0 msec 0 msec 0 msec
  2 192.168.2.1 1 msec 1 msec 0 msec
  3 192.168.1.1 1 msec 1 msec 0 msec
  4 209.165.201.1 1 msec 0 msec 1 msec
```

Trouble Ticket #26 – Advanced BGP Ticket

- Network requirements state that ISP3-CORE should be able to reach prefixes being advertised by ISP1.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that ISP3 is unable to reach 1.0.0.1 or 203.0.113.1 when sourcing packets from its Loopback 2 interface.
- Fix the problem so that you can achieve the same output below:

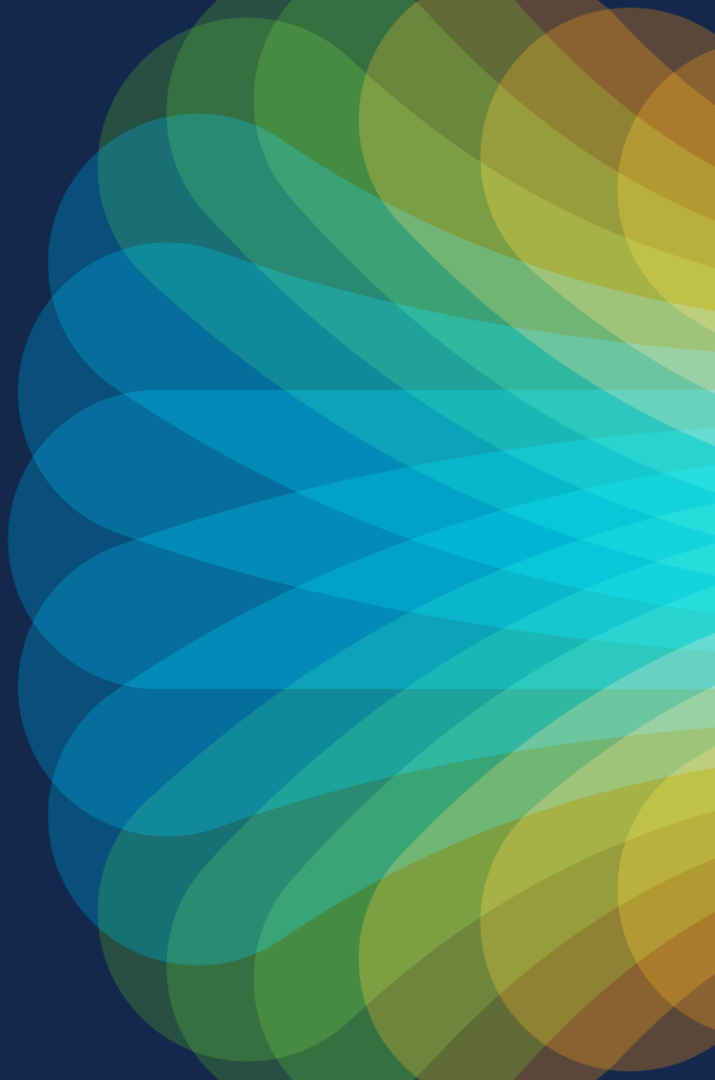
```
ISP3-CORE# ping 203.0.113.1 source loopback2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 203.0.113.1, timeout is 2 seconds:
Packet sent with a source address of 198.51.100.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms

ISP3-CORE# ping 1.0.0.1 source loopback2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.0.0.1, timeout is 2 seconds:
Packet sent with a source address of 198.51.100.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

Trouble Ticket #27 – Advanced BGP Ticket

- ISP3-PE2 has recently implemented route summarization of its 192.0.0.0/22 prefixes.
- After several changes to interface status, network addressing, routing schemes and layer 2 connectivity, a trouble ticket was opened indicating that EDGE is still receiving individual /32 prefixes as well as the summary.
- Fix the problem so that you can achieve the same output below:

```
EDGE# show ip bgp
     Network          Next Hop            Metric LocPrf Weight Path
 *    1.0.0.1/32       102.0.0.2                              0 65002 65003 65001 i
 *>                    101.0.0.1                0             0 65001 i
 *    2.0.0.2/32       101.0.0.1                              0 65001 65003 65002 i
 *>                    102.0.0.2                0             0 65002 i
 *    192.0.0.0/22     101.0.0.1                              0 65001 65003 i
 *>                    102.0.0.2                              0 65002 65003 i
 *    198.51.100.0     102.0.0.2                              0 65002 65003 i
 *>                    101.0.0.1                150           0 65001 65003 i
 *    203.0.113.1/32   102.0.0.2                              0 65002 65003 65001 i
 *>                    101.0.0.1                0             0 65001 i
 r    209.165.200.0/30 102.0.0.2                              0 65002 65003 65001 i
 r>                    101.0.0.1                0             0 65001 i
 r    209.165.201.0/30 101.0.0.1                              0 65001 65003 65002 i
 r>                    102.0.0.2                0             0 65002 i
```

Conclusion

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