

OSPF Troubleshooting and Best Practices

Presented by: Makito Lay

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KHNOG 7 Conference

About Me



- **Makito Lay**
 - Network Analyst / Technical Trainer @ APNIC
 - Volunteering:
 - TWNOG Multi-Stakeholder Group Member
 - KHNOG Executive Committee Member
 - Experiences:
 - 18 years in ISP and Telecom industry
 - MikroTik Certified Trainer
 - Ex-programmer
 - Certifications: CCIE # 47682, JNCIP-SP, MTCINE...etc.
 - Areas of Interest: BGP, MPLS, IPv6, Coding & Databases



Agenda



- Common OSPF Issues
- Troubleshooting Scenarios
- OSPF Best Practices

OSPF Troubleshooting and Best Practices

Common OSPF Issues

Common OSPF Issues



- No neighbor is seen.
 - Wrong Passive interface
 - Area mismatch
 - Subnet mismatch
 - OSPFv2 only
 - Timers mismatch
 - Duplicated Router ID
 - IOS XE
 - Junos OS

Common OSPF Issues

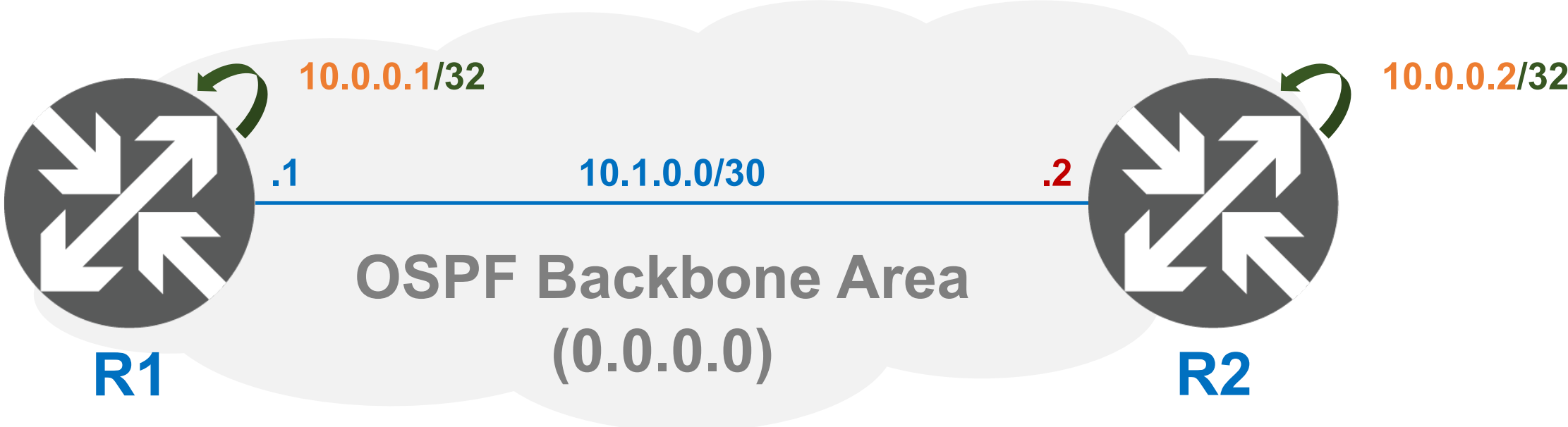


- Adjacency failure is observed.
 - Duplicated Router ID
 - ROS v6
 - MTU mismatch
 - Network Type mismatch
 - Junos OS
- Routes appear in LSDB but not in routing table.
 - Network Type mismatch
 - IOS XE
 - ROS v6

OSPF Troubleshooting and Best Practices

Scenario 1: Wrong Passive Interface

ISSUE: Wrong Passive Interface



		R1	R2
OSPF Configuration			
Router ID		10.0.0.1	10.0.0.2
PTP	Area	0.0.0.0	0.0.0.0
	Type	Point-to-Point	Point-to-Point
	Passive	No	Yes
Lo	Area	0.0.0.0	0.0.0.0
	Passive	Yes	Yes

- **Issue:**
 - No neighbor is seen on both routers
- **Root Cause:**
 - OSPF interface was wrongly set as Passive, or the router had all interfaces set to Passive by default
- **Solution:**
 - Disable Passive setting of the OSPF interface

TSHOOT: Wrong Passive Interface (IOS XE)



R1	R2
<pre>! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R1#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R1#show ip ospf interface brief Interface PID Area IP Address/Mask Cost State Nbrs F/C Lo0 1 0.0.0.0 10.0.0.1/32 10 LOOP 0/0 Gi1 1 0.0.0.0 10.1.0.1/30 10 P2P 0/0 ! Showing OSPFv2 interface GigabitEthernet1 ! OSPF is sending Hellos on this interface R1#show ip ospf interface GigabitEthernet1 GigabitEthernet1 is up, line protocol is up Internet Address 10.1.0.1/30, Area 0.0.0.0, Attached via Interface Enable Process ID 1, Router ID 10.0.0.1, Network Type POINT_TO_POINT, Cost: 10 Topology-MTID Cost Disabled Shutdown Topology Name 0 10 no no Base Enabled by interface config, including secondary ip addresses Transmit Delay is 1 sec, State POINT_TO_POINT Timer intervals configured, Hello 10, Dead 40, wait 40, Retransmit 5 oob-resync timeout 40 Hello due in 00:00:09 -- (snipped) --</pre>	<pre>! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R2#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R2#show ip ospf interface brief Interface PID Area IP Address/Mask Cost State Nbrs F/C Lo0 1 0.0.0.0 10.0.0.2/32 10 LOOP 0/0 Gi1 1 0.0.0.0 10.1.0.2/30 10 P2P 0/0 ! Showing OSPFv2 interface GigabitEthernet1 ! No Hello will be sent on this interface due to it is a Passive interface R2#show ip ospf interface GigabitEthernet1 GigabitEthernet1 is up, line protocol is up Internet Address 10.1.0.2/30, Area 0.0.0.0, Attached via Interface Enable Process ID 1, Router ID 10.0.0.2, Network Type POINT_TO_POINT, Cost: 10 Topology-MTID Cost Disabled Shutdown Topology Name 0 10 no no Base Enabled by interface config, including secondary ip addresses Transmit Delay is 1 sec, State POINT_TO_POINT Timer intervals configured, Hello 10, Dead 40, wait 40, Retransmit 5 oob-resync timeout 40 No Hellos (Passive interface) -- (snipped) --</pre>

FIX: Wrong Passive Interface (IOS XE)



R1	R2																																																
	router ospf 1 ! Undo setting GigabitEthernet1 as Passive interface no passive-interface GigabitEthernet1																																																
! Showing OSPFv2 neighbors and adjacencies R1#show ip ospf neighbor	! Showing OSPFv2 neighbors and adjacencies R2#show ip ospf neighbor																																																
<table><tr><td>Neighbor ID</td><td>Pri</td><td>State</td><td>Dead Time</td><td>Address</td><td>Interface</td></tr><tr><td>10.0.0.2</td><td>0</td><td>FULL/ -</td><td>00:00:36</td><td>10.1.0.2</td><td>GigabitEthernet1</td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.2	0	FULL/ -	00:00:36	10.1.0.2	GigabitEthernet1	<table><tr><td>Neighbor ID</td><td>Pri</td><td>State</td><td>Dead Time</td><td>Address</td><td>Interface</td></tr><tr><td>10.0.0.1</td><td>0</td><td>FULL/ -</td><td>00:00:32</td><td>10.1.0.1</td><td>GigabitEthernet1</td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.1	0	FULL/ -	00:00:32	10.1.0.1	GigabitEthernet1																								
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! Showing interfaces participating in OSPFv2 R1#show ip ospf interface brief	! Showing interfaces participating in OSPFv2 R2#show ip ospf interface brief																																																
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TSHOOT: Wrong Passive Interface (Junos OS)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R1> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R1> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.1, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R2> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 # No Hello will be sent on ge-0/0/0.0 due to it is a Passive interface apnic@R2> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.2, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>

FIX: Wrong Passive Interface (Junos OS)



R1	R2																																																
	# Undo setting ge-0/0/0.0 as Passive interface top delete protocol ospf area 0.0.0.0 interface ge-0/0/0.0 passive																																																
# Showing OSPFv2 neighbors and adjacencies apnic@R1> show ospf neighbor <table><tr><th>Address</th><th>Interface</th><th>State</th><th>ID</th><th>Pri</th><th>Dead</th></tr><tr><td>10.1.0.2</td><td>ge-0/0/0.0</td><td>Full</td><td>10.0.0.2</td><td>128</td><td>36</td></tr></table> # Showing OSPFv2 interface ge-0/0/0.0 apnic@R1> show ospf interface ge-0/0/0.0 detail <table><tr><th>Interface</th><th>State</th><th>Area</th><th>DR ID</th><th>BDR ID</th><th>Nbrs</th></tr><tr><td>ge-0/0/0.0</td><td>PtToPt</td><td>0.0.0.0</td><td>0.0.0.0</td><td>0.0.0.0</td><td>1</td></tr></table> Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10	Address	Interface	State	ID	Pri	Dead	10.1.0.2	ge-0/0/0.0	Full	10.0.0.2	128	36	Interface	State	Area	DR ID	BDR ID	Nbrs	ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1	# Showing OSPFv2 neighbors and adjacencies apnic@R2> show ospf neighbor <table><tr><th>Address</th><th>Interface</th><th>State</th><th>ID</th><th>Pri</th><th>Dead</th></tr><tr><td>10.1.0.1</td><td>ge-0/0/0.0</td><td>Full</td><td>10.0.0.1</td><td>128</td><td>32</td></tr></table> # Showing OSPFv2 interface ge-0/0/0.0 apnic@R2> show ospf interface ge-0/0/0.0 detail <table><tr><th>Interface</th><th>State</th><th>Area</th><th>DR ID</th><th>BDR ID</th><th>Nbrs</th></tr><tr><td>ge-0/0/0.0</td><td>PtToPt</td><td>0.0.0.0</td><td>0.0.0.0</td><td>0.0.0.0</td><td>1</td></tr></table> Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10	Address	Interface	State	ID	Pri	Dead	10.1.0.1	ge-0/0/0.0	Full	10.0.0.1	128	32	Interface	State	Area	DR ID	BDR ID	Nbrs	ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1
Address	Interface	State	ID	Pri	Dead																																												
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ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1																																												

TSHOOT: Wrong Passive Interface (ROS v6)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen [apnic@R1] > /routing ospf neighbor print # Showing interfaces participating in OSPFv2 # No neighbor is seen on ether1 [apnic@R1] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=0 adjacent-neighbors=0 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.1 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen [apnic@R2] > /routing ospf neighbor print # Showing interfaces participating in OSPFv2 # No neighbor is seen on ether1 # No Hello will be sent on ether1 due to it is a Passive interface [apnic@R2] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 P interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.2 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>

FIX: Wrong Passive Interface (ROS v6)

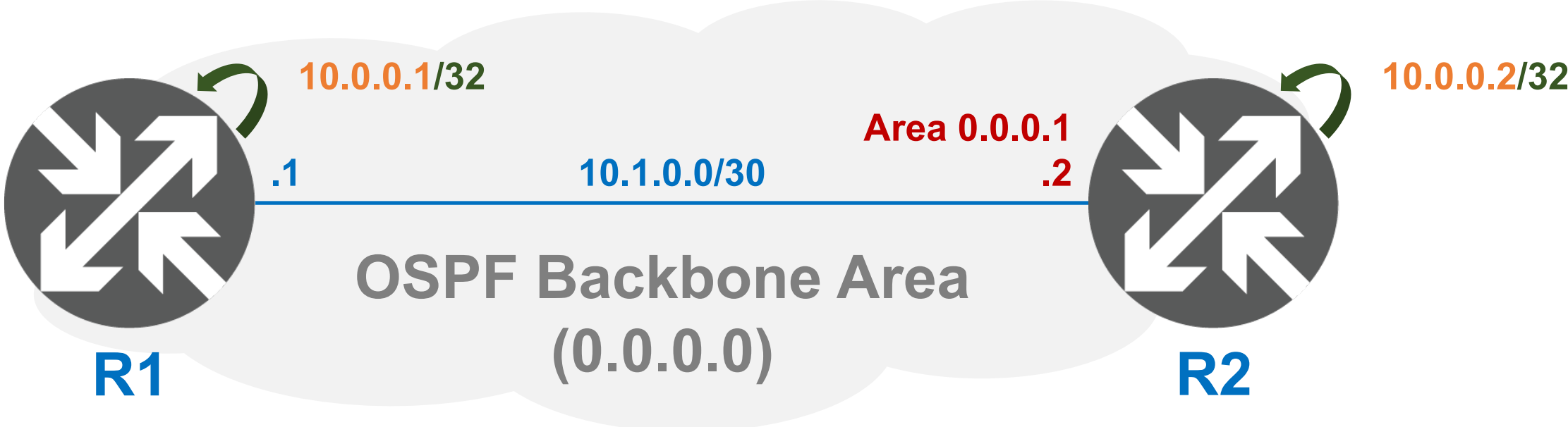


R1	R2
	<pre># Undo setting ether1 as Passive interface /routing ospf interface set [find interface=ether1] passive=no</pre>
<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.2 address=10.1.0.2 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=31s # Showing OSPFv2 interface ether1 [apnic@R1] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1</pre>	<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=4 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=31s # Showing OSPFv2 interface ether1 [apnic@R2] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1</pre>

OSPF Troubleshooting and Best Practices

Scenario 2: Area Mismatch

ISSUE: Area Mismatch



		R1	R2
OSPF Configuration			
Router ID		10.0.0.1	10.0.0.2
PTP	Area	0.0.0.0	0.0.0.1
	Type	Point-to-Point	Point-to-Point
	Passive	No	No
Lo	Area	0.0.0.0	0.0.0.0
	Passive	Yes	Yes

- **Issue:**
 - No neighbor is seen on both routers
- **Root Cause:**
 - OSPF Area mismatch between both ends of the link
- **Solution:**
 - Use the same Area at both ends of the link

TSHOOT: Area Mismatch (IOS XE)



R1	R2																																																
! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R1#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R1#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>P2P</td><td>0/0</td><td></td></tr></table>	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	0/0		! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R2#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R2#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.1</td><td>10.1.0.2/30</td><td>10</td><td>P2P</td><td>0/0</td><td></td></tr></table> ! R2 is complaining that it received invalid packet that has a mismatched Area ID R2# *Aug 8 2021 06:30:40.953 UTC: %OSPF-4-ERRRCV: Received invalid packet: mismatched area ID from backbone area from 10.1.0.1, GigabitEthernet1	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.1	10.1.0.2/30	10	P2P	0/0	
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
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Gi1	1	0.0.0.1	10.1.0.2/30	10	P2P	0/0																																											

FIX: Area Mismatch (IOS XE)



R1	R2																																																
	interface GigabitEthernet1 ! Run OSPF with Area 0 ip ospf 1 area 0.0.0.0																																																
! Showing OSPFv2 neighbors and adjacencies R1#show ip ospf neighbor	! Showing OSPFv2 neighbors and adjacencies R2#show ip ospf neighbor																																																
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10.0.0.1	0	FULL/ -	00:00:39	10.1.0.1	GigabitEthernet1																																												
! Showing interfaces participating in OSPFv2 R1#show ip ospf interface brief	! Showing interfaces participating in OSPFv2 R2#show ip ospf interface brief																																																
<table><tr><td>Interface</td><td>PID</td><td>Area</td><td>IP Address/Mask</td><td>Cost</td><td>State</td><td>Nbrs</td><td>F/C</td></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	1/1		<table><tr><td>Interface</td><td>PID</td><td>Area</td><td>IP Address/Mask</td><td>Cost</td><td>State</td><td>Nbrs</td><td>F/C</td></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.2/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1	
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0																																											
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Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1																																											

TSHOOT: Area Mismatch (Junos OS)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R1> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R1> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.1, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R2> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R2> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.1 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.2, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>

TSHOOT: Area Mismatch (Junos OS)



R1	R2
<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>	<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>
<pre># Monitor log file "OSPFV2" # Area mismatch between R1 and R2 apnic@R1> monitor start OSPFV2 apnic@R1> Jan 1 00:09:42.621270 OSPF packet ignored: area mismatch (0.0.0.1) from 10.1.0.2 on intf ge-0/0/0.0 area 0.0.0.0 Jan 1 00:09:42.621276 OSPF rcvd Hello 10.1.0.2 -> 224.0.0.5 (ge-0/0/0.0 IFL 71 area 0.0.0.0) Jan 1 00:09:42.621279 version 2, length 44, ID 10.0.0.2, area 0.0.0.1 Jan 1 00:09:42.621282 checksum 0xe120, authtype 0 Jan 1 00:09:42.621285 mask 255.255.255.252, hello_ivl 10, opts 0x12, prio 128 Jan 1 00:09:42.621287 dead_ivl 40, DR 0.0.0.0, BDR 0.0.0.0</pre>	<pre># Monitor log file "OSPFV2" # Area mismatch between R1 and R2 apnic@R2> monitor start OSPFV2 apnic@R2> Jan 1 00:09:45.049229 OSPF packet ignored: area mismatch (0.0.0.0) from 10.1.0.1 on intf ge-0/0/0.0 area 0.0.0.1 Jan 1 00:09:45.049242 OSPF rcvd Hello 10.1.0.1 -> 224.0.0.5 (ge-0/0/0.0 IFL 71 area 0.0.0.1) Jan 1 00:09:45.049245 version 2, length 44, ID 10.0.0.1, area 0.0.0.0 Jan 1 00:09:45.049248 checksum 0xe122, authtype 0 Jan 1 00:09:45.049251 mask 255.255.255.252, hello_ivl 10, opts 0x12, prio 128 Jan 1 00:09:45.049259 dead_ivl 40, DR 0.0.0.0, BDR 0.0.0.0</pre>

FIX: Area Mismatch (Junos OS)



R1	R2																																																
	top edit protocols ospf # Remove ge-0/0/0.0 from Area 1 delete area 0.0.0.1 interface ge-0/0/0.0 # Add ge-0/0/0.0 to Area 0 set area 0.0.0.0 interface ge-0/0/0.0 metric 10 interface-type p2p																																																
# Showing OSPFv2 neighbors and adjacencies apnic@R1> show ospf neighbor <table><tr><th>Address</th><th>Interface</th><th>State</th><th>ID</th><th>Pri</th><th>Dead</th></tr><tr><td>10.1.0.2</td><td>ge-0/0/0.0</td><td>Full</td><td>10.0.0.2</td><td>128</td><td>39</td></tr></table> # Showing OSPFv2 interface ge-0/0/0.0 apnic@R1> show ospf interface ge-0/0/0.0 detail <table><tr><th>Interface</th><th>State</th><th>Area</th><th>DR ID</th><th>BDR ID</th><th>Nbrs</th></tr><tr><td>ge-0/0/0.0</td><td>PtToPt</td><td>0.0.0.0</td><td>0.0.0.0</td><td>0.0.0.0</td><td>1</td></tr></table> Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10	Address	Interface	State	ID	Pri	Dead	10.1.0.2	ge-0/0/0.0	Full	10.0.0.2	128	39	Interface	State	Area	DR ID	BDR ID	Nbrs	ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1	# Showing OSPFv2 neighbors and adjacencies apnic@R2> show ospf neighbor <table><tr><th>Address</th><th>Interface</th><th>State</th><th>ID</th><th>Pri</th><th>Dead</th></tr><tr><td>10.1.0.1</td><td>ge-0/0/0.0</td><td>Full</td><td>10.0.0.1</td><td>128</td><td>32</td></tr></table> # Showing OSPFv2 interface ge-0/0/0.0 apnic@R2> show ospf interface ge-0/0/0.0 detail <table><tr><th>Interface</th><th>State</th><th>Area</th><th>DR ID</th><th>BDR ID</th><th>Nbrs</th></tr><tr><td>ge-0/0/0.0</td><td>PtToPt</td><td>0.0.0.0</td><td>0.0.0.0</td><td>0.0.0.0</td><td>1</td></tr></table> Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10	Address	Interface	State	ID	Pri	Dead	10.1.0.1	ge-0/0/0.0	Full	10.0.0.1	128	32	Interface	State	Area	DR ID	BDR ID	Nbrs	ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1
Address	Interface	State	ID	Pri	Dead																																												
10.1.0.2	ge-0/0/0.0	Full	10.0.0.2	128	39																																												
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ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1																																												
Address	Interface	State	ID	Pri	Dead																																												
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ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1																																												

TSHOOT: Area Mismatch (ROS v6)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen [apnic@R1] > /routing ospf neighbor print # Showing interfaces participating in OSPFv2 # No neighbor is seen on ether1 [apnic@R1] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=0 adjacent-neighbors=0 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.1 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen [apnic@R2] > /routing ospf neighbor print # Showing interfaces participating in OSPFv2 # No neighbor is seen on ether1 [apnic@R2] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 state=point-to-point instance=default area=AREA-1 neighbors=0 adjacent-neighbors=0 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.2 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>

TSHOOT: Area Mismatch (ROS v6)



R1	R2
<pre># Showing system logs that contain "ospf" topic # Area mismatch between R1 and R2 [apnic@R1] > /log print where topics~"ospf" -- (snipped) -- 00:09:18 route,ospf,info Discarding packet: mismatched area ID 00:09:18 route,ospf,info mine=0.0.0.0 00:09:18 route,ospf,info received=0.0.0.1 00:09:18 route,ospf,info source=10.1.0.2</pre>	<pre># Showing system logs that contain "ospf" topic # Area mismatch between R1 and R2 [apnic@R2] > /log print where topics~"ospf" -- (snipped) -- 00:09:22 route,ospf,info Discarding packet: mismatched area ID 00:09:22 route,ospf,info mine=0.0.0.1 00:09:22 route,ospf,info received=0.0.0.0 00:09:22 route,ospf,info source=10.1.0.1</pre>

FIX: Area Mismatch (ROS v6)



R1	R2
	<pre># Run OSPF with Area 0 /routing ospf network set [find network=10.1.0.0/30] area=backbone</pre>
<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.2 address=10.1.0.2 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=34s # Showing OSPFv2 interface ether1 [apnic@R1] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1</pre>	<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=4 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=34s # Showing OSPFv2 interface ether1 [apnic@R2] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1</pre>

OSPF Troubleshooting and Best Practices

Scenario 3: Subnet Mismatch

ISSUE: Subnet Mismatch



		R1	R2
OSPF Configuration			
Router ID		10.0.0.1	10.0.0.2
PTP	Area	0.0.0.0	0.0.0.0
	Type	Broadcast	Broadcast
	Passive	No	No
	IPv4	10.1.0.1/30	10.1.0.2/24
Lo	Area	0.0.0.0	0.0.0.0
	Passive	Yes	Yes

- **Issue:**
 - No neighbor is seen on both routers
- **Root Cause:**
 - IPv4 subnet mismatch between both ends of the link
- **Solution:**
 - Use the same IPv4 subnet at both ends of the link

TSHOOT: Subnet Mismatch (IOS XE)



R1	R2																																																
! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R1#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R1#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>DR</td><td>0/0</td><td></td></tr></table> ! Debugging OSPF Hello packets ! R1 is complaining about mismatched Hello parameters (subnet mask) R1#debug ip ospf hello R1# *Aug 8 2021 06:55:56.352 UTC: OSPF-1 HELLO Gi1: Send hello to 224.0.0.5 area 0.0.0.0 from 10.1.0.1 R1# *Aug 8 2021 06:55:58.192 UTC: OSPF-1 HELLO Gi1: Rcv hello from 10.0.0.2 area 0.0.0.0 10.1.0.2 *Aug 8 2021 06:55:58.192 UTC: OSPF-1 HELLO Gi1: Mismatched hello parameters from 10.1.0.2 *Aug 8 2021 06:55:58.192 UTC: OSPF-1 HELLO Gi1: Dead R 40 C 40, Hello R 10 C 10 Mask R 255.255.255.0 C 255.255.255.252	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	DR	0/0		! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R2#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R2#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.2/24</td><td>10</td><td>DR</td><td>0/0</td><td></td></tr></table> ! Debugging OSPF Hello packets ! R2 is complaining about mismatched Hello parameters (subnet mask) R2#debug ip ospf hello R2# *Aug 8 2021 06:55:57.432 UTC: OSPF-1 HELLO Gi1: Send hello to 224.0.0.5 area 0.0.0.0 from 10.1.0.2 R2# *Aug 8 2021 06:56:04.370 UTC: OSPF-1 HELLO Gi1: Rcv hello from 10.0.0.1 area 0.0.0.0 10.1.0.1 *Aug 8 2021 06:56:04.370 UTC: OSPF-1 HELLO Gi1: Mismatched hello parameters from 10.1.0.1 *Aug 8 2021 06:56:04.370 UTC: OSPF-1 HELLO Gi1: Dead R 40 C 40, Hello R 10 C 10 Mask R 255.255.255.252 C 255.255.255.0	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.2/24	10	DR	0/0	
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0																																											
Gi1	1	0.0.0.0	10.1.0.1/30	10	DR	0/0																																											
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
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Gi1	1	0.0.0.0	10.1.0.2/24	10	DR	0/0																																											

FIX: Subnet Mismatch (IOS XE)



R1	R2																																																
	Interface GigabitEthernet1 ! Use the same subnet mask as R1 ip address 10.1.0.2 255.255.255.252																																																
! Showing OSPFv2 neighbors and adjacencies R1#show ip ospf neighbor	! Showing OSPFv2 neighbors and adjacencies R2#show ip ospf neighbor																																																
<table><tr><td>Neighbor ID</td><td>Pri</td><td>State</td><td>Dead Time</td><td>Address</td><td>Interface</td></tr><tr><td>10.0.0.2</td><td>1</td><td>FULL/BDR</td><td>00:00:39</td><td>10.1.0.2</td><td>GigabitEthernet1</td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.2	1	FULL/BDR	00:00:39	10.1.0.2	GigabitEthernet1	<table><tr><td>Neighbor ID</td><td>Pri</td><td>State</td><td>Dead Time</td><td>Address</td><td>Interface</td></tr><tr><td>10.0.0.1</td><td>1</td><td>FULL/DR</td><td>00:00:32</td><td>10.1.0.1</td><td>GigabitEthernet1</td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.1	1	FULL/DR	00:00:32	10.1.0.1	GigabitEthernet1																								
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10.0.0.1	1	FULL/DR	00:00:32	10.1.0.1	GigabitEthernet1																																												
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Gi1	1	0.0.0.0	10.1.0.2/30	10	BDR	1/1																																											

TSHOOT: Subnet Mismatch (Junos OS)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R1> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R1> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRoher 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.1, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R2> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R2> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.0, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.0.0.2, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>

TSHOOT: Subnet Mismatch (Junos OS)



R1	R2
<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>	<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>
<pre># Monitor log file "OSPFV2" # Subnet mask mismatch between R1 and R2 apnic@R1> monitor start OSPFV2 apnic@R1> Jan 1 00:09:26.007302 OSPF packet ignored: netmask 255.255.255.0 mismatch from 10.1.0.2 on intf ge-0/0/0.0 area 0.0.0.0</pre>	<pre># Monitor log file "OSPFV2" # Subnet mask mismatch between R1 and R2 apnic@R2> monitor start OSPFV2 apnic@R2> Jan 1 00:09:32.973008 OSPF packet ignored: netmask 255.255.255.252 mismatch from 10.1.0.1 on intf ge-0/0/0.0 area 0.0.0.0</pre>

FIX: Subnet Mismatch (Junos OS)



R1	R2																																																
	top edit interface ge-0/0/0.0 family inet # Use the same subnet mask as R1 rename address 10.1.0.2/24 to address 10.1.0.2/30																																																
# Showing OSPFv2 neighbors and adjacencies apnic@R1> show ospf neighbor <table><tr><th>Address</th><th>Interface</th><th>State</th><th>ID</th><th>Pri</th><th>Dead</th></tr><tr><td>10.1.0.2</td><td>ge-0/0/0.0</td><td>Full</td><td>10.0.0.2</td><td>128</td><td>35</td></tr></table> # Showing OSPFv2 interface ge-0/0/0.0 apnic@R1> show ospf interface ge-0/0/0.0 detail <table><tr><th>Interface</th><th>State</th><th>Area</th><th>DR ID</th><th>BDR ID</th><th>Nbrs</th></tr><tr><td>ge-0/0/0.0</td><td>PtToPt</td><td>0.0.0.0</td><td>0.0.0.0</td><td>0.0.0.0</td><td>1</td></tr></table> Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10	Address	Interface	State	ID	Pri	Dead	10.1.0.2	ge-0/0/0.0	Full	10.0.0.2	128	35	Interface	State	Area	DR ID	BDR ID	Nbrs	ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1	# Showing OSPFv2 neighbors and adjacencies apnic@R2> show ospf neighbor <table><tr><th>Address</th><th>Interface</th><th>State</th><th>ID</th><th>Pri</th><th>Dead</th></tr><tr><td>10.1.0.1</td><td>ge-0/0/0.0</td><td>Full</td><td>10.0.0.1</td><td>128</td><td>30</td></tr></table> # Showing OSPFv2 interface ge-0/0/0.0 apnic@R2> show ospf interface ge-0/0/0.0 detail <table><tr><th>Interface</th><th>State</th><th>Area</th><th>DR ID</th><th>BDR ID</th><th>Nbrs</th></tr><tr><td>ge-0/0/0.0</td><td>PtToPt</td><td>0.0.0.0</td><td>0.0.0.0</td><td>0.0.0.0</td><td>1</td></tr></table> Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10	Address	Interface	State	ID	Pri	Dead	10.1.0.1	ge-0/0/0.0	Full	10.0.0.1	128	30	Interface	State	Area	DR ID	BDR ID	Nbrs	ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1
Address	Interface	State	ID	Pri	Dead																																												
10.1.0.2	ge-0/0/0.0	Full	10.0.0.2	128	35																																												
Interface	State	Area	DR ID	BDR ID	Nbrs																																												
ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1																																												
Address	Interface	State	ID	Pri	Dead																																												
10.1.0.1	ge-0/0/0.0	Full	10.0.0.1	128	30																																												
Interface	State	Area	DR ID	BDR ID	Nbrs																																												
ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1																																												

TSHOOT: Subnet Mismatch (ROS v6)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen [apnic@R1] > /routing ospf neighbor print # Showing interfaces participating in OSPFv2 # No neighbor is seen on ether1 [apnic@R1] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 used-network-type=broadcast state=designated-router instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=10.1.0.1 backup-designated-router=0.0.0.0 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.1 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen [apnic@R2] > /routing ospf neighbor print # Showing interfaces participating in OSPFv2 # No neighbor is seen on ether1 [apnic@R2] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 used-network-type=broadcast state=designated-router instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=10.1.0.2 backup-designated-router=0.0.0.0 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.2 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>

TSHOOT: Subnet Mismatch (ROS v6)



R1	R2
<pre># Showing system logs that contain "ospf" topic # Subnet mismatch between R1 and R2 [apnic@R1] > /log print where topics~"ospf" -- (snipped) -- 00:09:25 route,ospf,info Discarding Hello packet: mismatch in network mask 00:09:25 route,ospf,info mine=255.255.255.252 00:09:25 route,ospf,info remote=255.255.255.0 00:09:25 route,ospf,info source=10.1.0.2</pre>	<pre># Showing system logs that contain "ospf" topic # Subnet mismatch between R1 and R2 [apnic@R2] > /log print where topics~"ospf" -- (snipped) -- 00:09:33 route,ospf,info Discarding Hello packet: mismatch in network mask 00:09:33 route,ospf,info mine=255.255.255.0 00:09:33 route,ospf,info remote=255.255.255.252 00:09:33 route,ospf,info source=10.1.0.1</pre>

FIX: Subnet Mismatch (ROS v6)

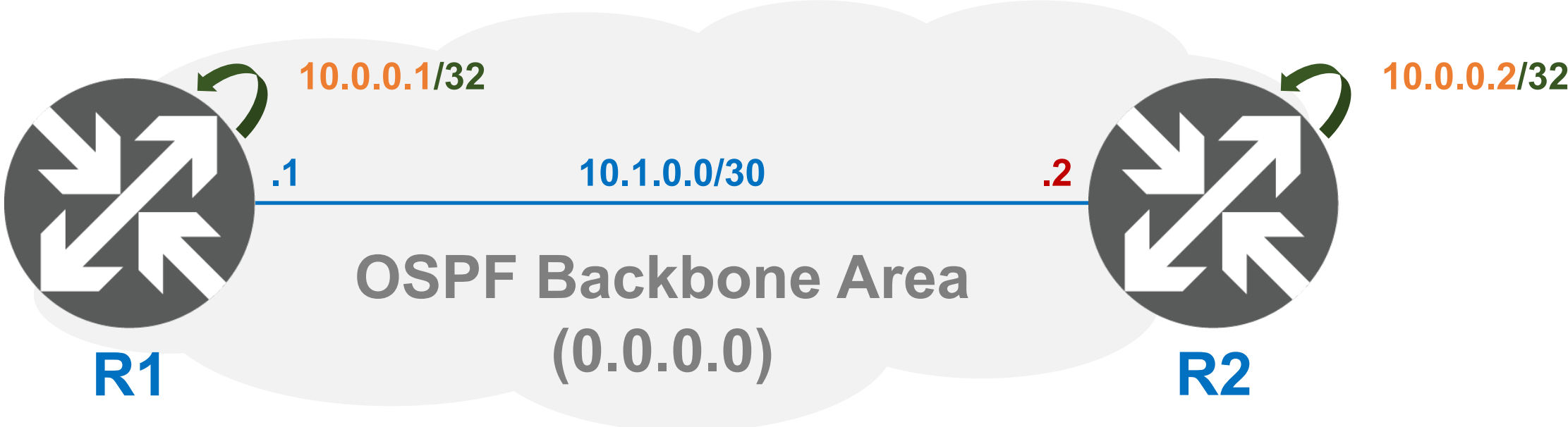


R1	R2
	<pre># Use the same subnet mask as R1 /ip address set [find interface=ether1] address=10.1.0.2/30 # Use the same subnet mask as R1 /routing ospf network set [find network=10.1.0.0/24] network=10.1.0.0/30</pre>
<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.2 address=10.1.0.2 interface=ether1 priority=1 dr-address=10.1.0.1 backup-dr-address=10.1.0.2 state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=29s # Showing OSPFv2 interface ether1 [apnic@R1] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 used-network-type=broadcast state=designated-router instance=default area=backbone neighbors=1 adjacent-neighbors=1 designated-router=10.1.0.1 backup-designated-router=10.1.0.2</pre>	<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether1 priority=1 dr-address=10.1.0.1 backup-dr-address=10.1.0.2 state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=30s # Showing OSPFv2 interface ether1 [apnic@R2] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 used-network-type=broadcast state=backup instance=default area=backbone neighbors=1 adjacent-neighbors=1 designated-router=10.1.0.1 backup-designated-router=10.1.0.2</pre>

OSPF Troubleshooting and Best Practices

Scenario 4: Timers Mismatch

ISSUE: Timers Mismatch



		R1	R2
OSPF Configuration			
Router ID		10.0.0.1	10.0.0.2
PTP	Area	0.0.0.0	0.0.0.0
	Type	Broadcast	Broadcast
	Passive	No	No
	Hello / Dead	10 / 40	5 / 20
Lo	Area	0.0.0.0	0.0.0.0
	Passive	Yes	Yes

- **Issue:**
 - No neighbor is seen on both routers
- **Root Cause:**
 - OSPF timers mismatch between both ends of the link
- **Solution:**
 - Use the same OSPF timers at both ends of the link

TSHOOT: Timers Mismatch (IOS XE)



R1	R2																																																
! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R1#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R1#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>P2P</td><td>0/0</td><td></td></tr></table> ! Debugging OSPF Hello packets ! R1 is complaining about mismatched Hello parameters (timers) R1#debug ip ospf hello R1# *Aug 8 2021 07:13:28.450 UTC: OSPF-1 HELLO Gi1: Send hello to 224.0.0.5 area 0.0.0.0 from 10.1.0.1 *Aug 8 2021 07:13:32.309 UTC: OSPF-1 HELLO Gi1: Rcv hello from 10.0.0.2 area 0.0.0.0 10.1.0.2 *Aug 8 2021 07:13:32.309 UTC: OSPF-1 HELLO Gi1: Mismatched hello parameters from 10.1.0.2 *Aug 8 2021 07:13:32.309 UTC: OSPF-1 HELLO Gi1: Dead R 20 C 40, Hello R 5 C 10	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	0/0		! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R2#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R2#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.2/30</td><td>10</td><td>P2P</td><td>0/0</td><td></td></tr></table> ! Debugging OSPF Hello packets ! R2 is complaining about mismatched Hello parameters (timers) R2#debug ip ospf hello R2# *Aug 8 2021 07:13:36.984 UTC: OSPF-1 HELLO Gi1: Send hello to 224.0.0.5 area 0.0.0.0 from 10.1.0.2 *Aug 8 2021 07:13:37.769 UTC: OSPF-1 HELLO Gi1: Rcv hello from 10.0.0.1 area 0.0.0.0 10.1.0.1 *Aug 8 2021 07:13:37.769 UTC: OSPF-1 HELLO Gi1: Mismatched hello parameters from 10.1.0.1 *Aug 8 2021 07:13:37.769 UTC: OSPF-1 HELLO Gi1: Dead R 40 C 20, Hello R 10 C 5	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	0/0	
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0																																											
Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	0/0																																											
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0																																											
Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	0/0																																											

FIX: Timers Mismatch (IOS XE)



R1	R2																																																																								
	<pre>interface GigabitEthernet1 ! Use the same Hello Interval (10) as R1 ip ospf hello-interval 10 ! Use the same Dead Interval (40) as R1 ip ospf dead-interval 40 -- OR -- interface GigabitEthernet1 ! Unset Hello Interval, use default value (same as R1) no ip ospf hello-interval ! Unset Dead Interval, use default value (same as R1) no ip ospf dead-interval</pre>																																																																								
! Showing OSPFv2 neighbors and adjacencies R1#show ip ospf neighbor <table><tr><th>Neighbor ID</th><th>Pri</th><th>State</th><th>Dead Time</th><th>Address</th><th>Interface</th></tr><tr><td>10.0.0.2</td><td>0</td><td>FULL/ -</td><td>00:00:31</td><td>10.1.0.2</td><td>GigabitEthernet1</td></tr></table> ! Showing interfaces participating in OSPFv2 R1#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.2	0	FULL/ -	00:00:31	10.1.0.2	GigabitEthernet1	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	1/1		! Showing OSPFv2 neighbors and adjacencies R2#show ip ospf neighbor <table><tr><th>Neighbor ID</th><th>Pri</th><th>State</th><th>Dead Time</th><th>Address</th><th>Interface</th></tr><tr><td>10.0.0.1</td><td>0</td><td>FULL/ -</td><td>00:00:37</td><td>10.1.0.1</td><td>GigabitEthernet1</td></tr></table> ! Showing interfaces participating in OSPFv2 R2#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.2/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.1	0	FULL/ -	00:00:37	10.1.0.1	GigabitEthernet1	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1	
Neighbor ID	Pri	State	Dead Time	Address	Interface																																																																				
10.0.0.2	0	FULL/ -	00:00:31	10.1.0.2	GigabitEthernet1																																																																				
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																																																		
Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0																																																																			
Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	1/1																																																																			
Neighbor ID	Pri	State	Dead Time	Address	Interface																																																																				
10.0.0.1	0	FULL/ -	00:00:37	10.1.0.1	GigabitEthernet1																																																																				
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																																																		
Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0																																																																			
Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1																																																																			

TSHOOT: Timers Mismatch (Junos OS)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R1> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R1> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.1, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R2> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R2> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 5, Dead: 20, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.2, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>

TSHOOT: Timers Mismatch (Junos OS)



R1	R2
<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>	<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>
<pre># Monitor log file "OSPFV2" # Timers mismatch between R1 and R2 apnic@R1> monitor start OSPFV2 apnic@R1> Jan 1 00:09:58.551306 OSPF packet ignored: hello interval mismatch 5 from 10.1.0.2 on intf ge-0/0/0.0 area 0.0.0.0</pre>	<pre># Monitor log file "OSPFV2" # Timers mismatch between R1 and R2 apnic@R2> monitor start OSPFV2 apnic@R2> Jan 1 00:10:05.803834 OSPF packet ignored: hello interval mismatch 10 from 10.1.0.1 on intf ge-0/0/0.0 area 0.0.0.0</pre>

FIX: Timers Mismatch (Junos OS)



R1	R2
	<pre>top edit protocols ospf area 0.0.0.0 interface ge-0/0/0.0 # Use the same Hello Interval (10) and Dead Interval (40) as R1 set hello-interval 10 dead-interval 40 -- OR -- top edit protocols ospf area 0.0.0.0 interface ge-0/0/0.0 # Unset Hello Interval, use default value (same as R1) delete hello-interval # Unset Dead Interval, use default value (same as R1) delete dead-interval</pre>
<pre># Showing OSPFv2 neighbors and adjacencies apnic@R1> show ospf neighbor Address Interface State ID Pri Dead 10.1.0.2 ge-0/0/0.0 Full 10.0.0.2 128 36 # Showing OSPFv2 interface ge-0/0/0.0 apnic@R1> show ospf interface ge-0/0/0.0 detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 1 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None -- (snipped) --</pre>	<pre># Showing OSPFv2 neighbors and adjacencies apnic@R2> show ospf neighbor Address Interface State ID Pri Dead 10.1.0.1 ge-0/0/0.0 Full 10.0.0.1 128 31 # Showing OSPFv2 interface ge-0/0/0.0 apnic@R2> show ospf interface ge-0/0/0.0 detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 1 Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None -- (snipped) --</pre>

TSHOOT: Timers Mismatch (ROS v6)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen [apnic@R1] > /routing ospf neighbor print # Showing interfaces participating in OSPFv2 # No neighbor is seen on ether1 [apnic@R1] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=0 adjacent-neighbors=0 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.1 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen [apnic@R2] > /routing ospf neighbor print # Showing interfaces participating in OSPFv2 # No neighbor is seen on ether1 [apnic@R2] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=5s dead-interval=20s use-bfd=no ip-address=10.1.0.2 state=point-to-point instance=default area=backbone neighbors=0 adjacent-neighbors=0 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.2 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>

TSHOOT: Timers Mismatch (ROS v6)



R1	R2
<pre># Showing system logs that contain "ospf" topic # Subnet mismatch between R1 and R2 [apnic@R1] > /log print where topics~"ospf" -- (snipped) -- 00:09:41 route,ospf,info Discarding Hello packet: mismatch in hello-interval 00:09:41 route,ospf,info mine=10 00:09:41 route,ospf,info remote=5 00:09:41 route,ospf,info source=10.1.0.2</pre>	<pre># Showing system logs that contain "ospf" topic # Subnet mismatch between R1 and R2 [apnic@R2] > /log print where topics~"ospf" -- (snipped) -- 00:09:47 route,ospf,info Discarding Hello packet: mismatch in hello-interval 00:09:47 route,ospf,info mine=5 00:09:47 route,ospf,info remote=10 00:09:47 route,ospf,info source=10.1.0.1</pre>

FIX: Timers Mismatch (ROS v6)

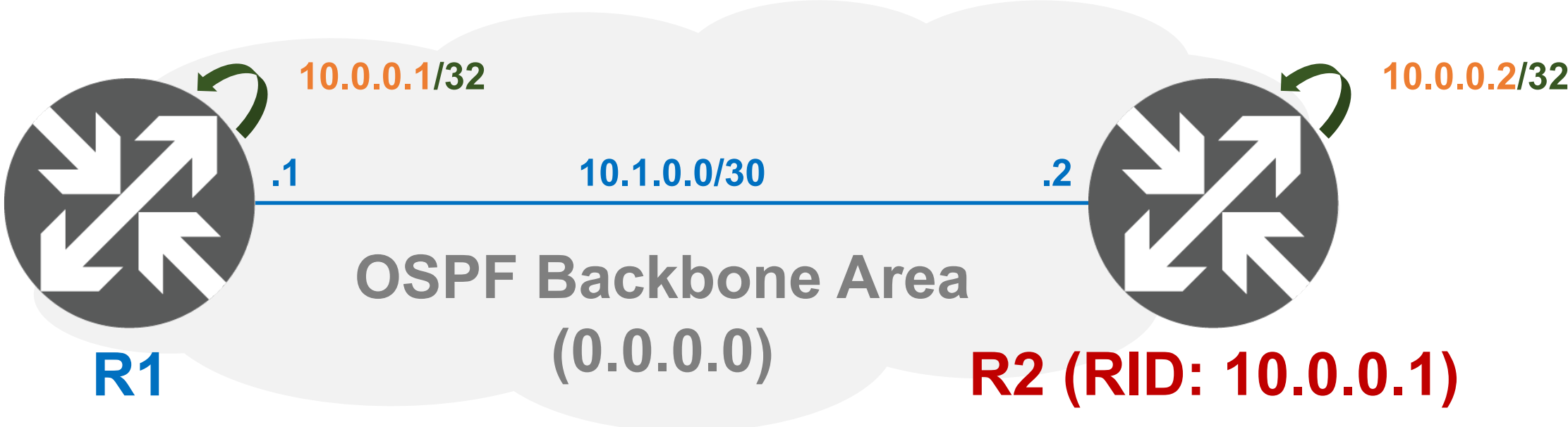


R1	R2
	<pre>/routing ospf interface # Use the same Hello Interval (10) and Dead Interval (40) as R1 set [find interface=ether1] hello-interval=10 dead-interval=40</pre>
<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.2 address=10.1.0.2 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=30s # Showing OSPFv2 interface ether1 [apnic@R1] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1</pre>	<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=4 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=32s # Showing OSPFv2 interface ether1 [apnic@R2] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1</pre>

OSPF Troubleshooting and Best Practices

Scenario 5: Duplicated Router ID

ISSUE: Duplicated Router ID



		R1	R2
OSPF Configuration			
Router ID		10.0.0.1	10.0.0.1
PTP	Area	0.0.0.0	0.0.0.0
	Type	Broadcast	Broadcast
	Passive	No	No
Lo	Area	0.0.0.0	0.0.0.0
	Passive	Yes	Yes

- **Issue:**
 - IOS XE / Junos OS: No neighbor is seen on both routers
 - ROS v6: Neighbor is seen, but adjacency failure is observed
- **Root Cause:**
 - R2 was mistakenly configured to use the same Router ID as R1
- **Solution:**
 - Configure unique Router ID for R2

TSHOOT: Duplicated Router ID (IOS XE)



R1	R2																																																
! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R1#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R1#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>P2P</td><td>0/0</td><td></td></tr></table> ! R1 is complaining about duplicated Router ID R1# *Aug 8 2021 07:27:57.599 UTC: %OSPF-4-DUP_RTRID_NBR: OSPF detected duplicate router-id 10.0.0.1 from 10.1.0.2 on interface GigabitEthernet1 ! Verifying OSPFv2 Router ID ! R1 is using Router ID 10.0.0.1 R1#show ip ospf 1 include ID Routing Process "ospf 1" with ID 10.0.0.1	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	0/0		! Showing OSPFv2 neighbors and adjacencies ! No neighbor is seen R2#show ip ospf neighbor ! Showing interfaces participating in OSPFv2 ! No neighbor is seen on GigabitEthernet1 R2#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.2/30</td><td>10</td><td>P2P</td><td>0/0</td><td></td></tr></table> ! R2 is complaining about duplicated Router ID R2# *Aug 8 2021 07:28:09.027 UTC: %OSPF-4-DUP_RTRID_NBR: OSPF detected duplicate router-id 10.0.0.1 from 10.1.0.1 on interface GigabitEthernet1 ! Verifying OSPFv2 Router ID ! R2 is also using R1's Router ID 10.0.0.1 R2#show ip ospf 1 include ID Routing Process "ospf 1" with ID 10.0.0.1	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	0/0	
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0																																											
Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	0/0																																											
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0																																											
Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	0/0																																											

FIX: Duplicated Router ID (IOS XE)



R1	R2																																																
	router ospf 1 ! Set correct Router ID 10.0.0.2 for R2 router-id 10.0.0.2																																																
! Showing OSPFv2 neighbors and adjacencies R1#show ip ospf neighbor	! Showing OSPFv2 neighbors and adjacencies R2#show ip ospf neighbor																																																
<table><tr><td>Neighbor ID</td><td>Pri</td><td>State</td><td>Dead Time</td><td>Address</td><td>Interface</td></tr><tr><td>10.0.0.2</td><td>0</td><td>FULL/ -</td><td>00:00:35</td><td>10.1.0.2</td><td>GigabitEthernet1</td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.2	0	FULL/ -	00:00:35	10.1.0.2	GigabitEthernet1	<table><tr><td>Neighbor ID</td><td>Pri</td><td>State</td><td>Dead Time</td><td>Address</td><td>Interface</td></tr><tr><td>10.0.0.1</td><td>0</td><td>FULL/ -</td><td>00:00:36</td><td>10.1.0.1</td><td>GigabitEthernet1</td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.1	0	FULL/ -	00:00:36	10.1.0.1	GigabitEthernet1																								
Neighbor ID	Pri	State	Dead Time	Address	Interface																																												
10.0.0.2	0	FULL/ -	00:00:35	10.1.0.2	GigabitEthernet1																																												
Neighbor ID	Pri	State	Dead Time	Address	Interface																																												
10.0.0.1	0	FULL/ -	00:00:36	10.1.0.1	GigabitEthernet1																																												
! Showing interfaces participating in OSPFv2 R1#show ip ospf interface brief	! Showing interfaces participating in OSPFv2 R2#show ip ospf interface brief																																																
<table><tr><td>Interface</td><td>PID</td><td>Area</td><td>IP Address/Mask</td><td>Cost</td><td>State</td><td>Nbrs</td><td>F/C</td></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	1/1		<table><tr><td>Interface</td><td>PID</td><td>Area</td><td>IP Address/Mask</td><td>Cost</td><td>State</td><td>Nbrs</td><td>F/C</td></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.2/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1	
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0																																											
Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	1/1																																											
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0																																											
Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1																																											

TSHOOT: Duplicated Router ID (Junos OS)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R1> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R1> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.1, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R2> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R2> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.2, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>

TSHOOT: Duplicated Router ID (Junos OS)



R1	R2
<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>	<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>
<pre># Monitor log file "OSPFV2" # R1 is complaining about duplicated Router ID apnic@R1> monitor start OSPFV2 apnic@R1> Jan 1 00:09:31.005307 OSPF packet ignored: our router ID received from 10.1.0.2 on intf ge-0/0/0.0 area 0.0.0.0 # Verifying OSPFv2 Router ID # R1 is using Router ID 10.0.0.1 apnic@R1> show ospf overview match ID Router ID: 10.0.0.1</pre>	<pre># Monitor log file "OSPFV2" # R2 is complaining about duplicated Router ID apnic@R2> monitor start OSPFV2 apnic@R2> Jan 1 00:09:36.928329 OSPF packet ignored: our router ID received from 10.1.0.1 on intf ge-0/0/0.0 area 0.0.0.0 # Verifying OSPFv2 Router ID # R2 is also using R1's Router ID 10.0.0.1 apnic@R2> show ospf overview match ID Router ID: 10.0.0.1</pre>

FIX: Duplicated Router ID (Junos OS)



R1	R2																																																
	# Set correct Router ID 10.0.0.2 for R2 top set routing-options router-id 10.0.0.2																																																
# Showing OSPFv2 neighbors and adjacencies apnic@R1> show ospf neighbor <table><tr><th>Address</th><th>Interface</th><th>State</th><th>ID</th><th>Pri</th><th>Dead</th></tr><tr><td>10.1.0.2</td><td>ge-0/0/0.0</td><td>Full</td><td>10.0.0.2</td><td>128</td><td>37</td></tr></table> # Showing OSPFv2 interface ge-0/0/0.0 apnic@R1> show ospf interface ge-0/0/0.0 detail <table><tr><th>Interface</th><th>State</th><th>Area</th><th>DR ID</th><th>BDR ID</th><th>Nbrs</th></tr><tr><td>ge-0/0/0.0</td><td>PtToPt</td><td>0.0.0.0</td><td>0.0.0.0</td><td>0.0.0.0</td><td>1</td></tr></table> Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10	Address	Interface	State	ID	Pri	Dead	10.1.0.2	ge-0/0/0.0	Full	10.0.0.2	128	37	Interface	State	Area	DR ID	BDR ID	Nbrs	ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1	# Showing OSPFv2 neighbors and adjacencies apnic@R2> show ospf neighbor <table><tr><th>Address</th><th>Interface</th><th>State</th><th>ID</th><th>Pri</th><th>Dead</th></tr><tr><td>10.1.0.1</td><td>ge-0/0/0.0</td><td>Full</td><td>10.0.0.1</td><td>128</td><td>35</td></tr></table> # Showing OSPFv2 interface ge-0/0/0.0 apnic@R2> show ospf interface ge-0/0/0.0 detail <table><tr><th>Interface</th><th>State</th><th>Area</th><th>DR ID</th><th>BDR ID</th><th>Nbrs</th></tr><tr><td>ge-0/0/0.0</td><td>PtToPt</td><td>0.0.0.0</td><td>0.0.0.0</td><td>0.0.0.0</td><td>1</td></tr></table> Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10	Address	Interface	State	ID	Pri	Dead	10.1.0.1	ge-0/0/0.0	Full	10.0.0.1	128	35	Interface	State	Area	DR ID	BDR ID	Nbrs	ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1
Address	Interface	State	ID	Pri	Dead																																												
10.1.0.2	ge-0/0/0.0	Full	10.0.0.2	128	37																																												
Interface	State	Area	DR ID	BDR ID	Nbrs																																												
ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1																																												
Address	Interface	State	ID	Pri	Dead																																												
10.1.0.1	ge-0/0/0.0	Full	10.0.0.1	128	35																																												
Interface	State	Area	DR ID	BDR ID	Nbrs																																												
ge-0/0/0.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1																																												

TSHOOT: Duplicated Router ID (ROS v6)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # Neighbor 10.0.0.2 is stuck in TWO-WAY state and many state changes occurred [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.2 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="2-way" state-changes=193 ls-retransmits=0 ls-requests=0 db-summaries=0 # Showing interfaces participating in OSPFv2 # 1 neighbor is reported as adjacent neighbor, but in fact it is stuck in TWO-WAY state [apnic@R1] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.1 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # Neighbor 10.0.0.1 is stuck in TWO-WAY state and many state changes occurred [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="2-way" state-changes=205 ls-retransmits=0 ls-requests=0 db-summaries=0 # Showing interfaces participating in OSPFv2 # 1 neighbor is reported as adjacent neighbor, but in fact it is stuck in TWO-WAY state [apnic@R2] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.2 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>

TSHOOT: Duplicated Router ID (ROS v6)



R1	R2
<pre># Showing system logs that contain "ospf" topic # R1 is complaining about duplicated Router ID [apnic@R1] > /log print where topics~"ospf" -- (snipped) -- 00:09:37 route,ospf,info Database Description packet has different master status flag 00:09:37 route,ospf,info new master flag=true 00:09:37 route,ospf,info local and remote router-id are the same 00:09:37 route,ospf,info OSPFv2 neighbor 10.0.0.1: state change from Exchange to 2-Way # Showing OSPFv2 protocol overview # R1 is using Router ID 10.0.0.1 [apnic@R1] > /routing ospf instance print status Flags: X - disabled, * - default 0 * name="default" router-id=10.0.0.1 distribute-default=never redistribute-connected=no redistribute-static=no redistribute-rip=no redistribute-bgp=no redistribute-other-ospf=no metric-default=1 metric-connected=20 metric-static=20 metric-rip=20 metric-bgp=auto metric-other-ospf=auto in-filter=ospf-in out-filter=ospf-out state=running effective-router-id=10.0.0.1 dijkstras=2 db-exchanges=0 external-imports=0</pre>	<pre># Showing system logs that contain "ospf" topic # R2 is complaining about duplicated Router ID [apnic@R2] > /log print where topics~"ospf" -- (snipped) -- 00:09:40 route,ospf,info Database Description packet has different master status flag 00:09:40 route,ospf,info new master flag=true 00:09:40 route,ospf,info local and remote router-id are the same 00:09:40 route,ospf,info OSPFv2 neighbor 10.0.0.1: state change from Exchange to 2-Way # Showing OSPFv2 protocol overview # R2 is also using R1's Router ID 10.0.0.1 [apnic@R2] > /routing ospf instance print status Flags: X - disabled, * - default 0 * name="default" router-id=10.0.0.1 distribute-default=never redistribute-connected=no redistribute-static=no redistribute-rip=no redistribute-bgp=no redistribute-other-ospf=no metric-default=1 metric-connected=20 metric-static=20 metric-rip=20 metric-bgp=auto metric-other-ospf=auto in-filter=ospf-in out-filter=ospf-out state=running effective-router-id=10.0.0.1 dijkstras=2 db-exchanges=0 external-imports=0</pre>

FIX: Duplicated Router ID (ROS v6)



R1	R2
	# Set correct Router ID 10.0.0.2 for R2 <code>/routing ospf instance set default router-id=10.0.0.2</code>
# Showing OSPFv2 neighbors and adjacencies [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.2 address=10.1.0.2 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=35s # Showing OSPFv2 interface ether1 [apnic@R1] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1	# Showing OSPFv2 neighbors and adjacencies [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=4 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=36s # Showing OSPFv2 interface ether1 [apnic@R2] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1

OSPF Troubleshooting and Best Practices

Scenario 6: MTU Mismatch

ISSUE: MTU Mismatch



		R1	R2
OSPF Configuration			
Router ID		10.0.0.1	10.0.0.2
PTP	Area	0.0.0.0	0.0.0.0
	Type	Point-to-Point	Point-to-Point
	Passive	No	No
	IPv4 MTU	1500	1450
Lo	Area	0.0.0.0	0.0.0.0
	Passive	Yes	Yes

- **Issue:**
 - Neighbor is seen, but adjacency failure is observed
- **Root Cause:**
 - IPv4 MTU mismatch between both ends of the link
- **Solution:**
 - Use the same IPv4 MTU at both ends of the link

TSHOOT: MTU Mismatch (IOS XE)



R1	R2																																																																								
! Showing OSPFv2 neighbors and adjacencies ! Neighbor 10.0.0.2 is stuck in EXCHANGE state R1#show ip ospf neighbor <table><tr><th>Neighbor ID</th><th>Pri</th><th>State</th><th>Dead Time</th><th>Address</th><th>Interface</th></tr><tr><td>10.0.0.2</td><td>0</td><td>EXCHANGE/ -</td><td>00:00:37</td><td>10.1.0.2</td><td>GigabitEthernet1</td></tr></table> ! Showing interfaces participating in OSPFv2 ! 1 neighbor is seen, but no neighbor is fully adjacent R1#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>P2P</td><td>0/1</td><td></td></tr></table> ! Debugging OSPF adjacency events ! R1 is complaining that R2 has smaller interface MTU (1450) R1#debug ip ospf adj R1# *Aug 8 2021 07:51:41.280 UTC: OSPF-1 ADJ Gi1: Rcv DBD from 10.0.0.2 seq 0x8E5 opt 0x52 flag 0x7 len 32 mtu 1450 state EXCHANGE *Aug 8 2021 07:51:41.280 UTC: OSPF-1 ADJ Gi1: Nbr 10.0.0.2 has smaller interface MTU *Aug 8 2021 07:51:41.280 UTC: OSPF-1 ADJ Gi1: Send DBD to 10.0.0.2 seq 0x8E5 opt 0x52 flag 0x0 len 32	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.2	0	EXCHANGE/ -	00:00:37	10.1.0.2	GigabitEthernet1	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	0/1		! Showing OSPFv2 neighbors and adjacencies ! Neighbor 10.0.0.1 is stuck in EXSTART state R2#show ip ospf neighbor <table><tr><th>Neighbor ID</th><th>Pri</th><th>State</th><th>Dead Time</th><th>Address</th><th>Interface</th></tr><tr><td>10.0.0.1</td><td>0</td><td>EXSTART/ -</td><td>00:00:36</td><td>10.1.0.1</td><td>GigabitEthernet1</td></tr></table> ! Showing interfaces participating in OSPFv2 ! 1 neighbor is seen, but no neighbor is fully adjacent R2#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.2/30</td><td>10</td><td>P2P</td><td>0/1</td><td></td></tr></table> ! Debugging OSPF adjacency events ! R2 is complaining that R1 has larger interface MTU (1500) R2#debug ip ospf adj R2# *Aug 8 2021 07:51:45.863 UTC: OSPF-1 ADJ Gi1: Send DBD to 10.0.0.1 seq 0x8E5 opt 0x52 flag 0x7 len 32 *Aug 8 2021 07:51:45.863 UTC: OSPF-1 ADJ Gi1: Retransmitting DBD to 10.0.0.1 [13] *Aug 8 2021 07:51:45.864 UTC: OSPF-1 ADJ Gi1: Rcv DBD from 10.0.0.1 seq 0x8E5 opt 0x52 flag 0x0 len 32 mtu 1500 state EXSTART *Aug 8 2021 07:51:45.864 UTC: OSPF-1 ADJ Gi1: Nbr 10.0.0.1 has larger interface MTU	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.1	0	EXSTART/ -	00:00:36	10.1.0.1	GigabitEthernet1	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	0/1	
Neighbor ID	Pri	State	Dead Time	Address	Interface																																																																				
10.0.0.2	0	EXCHANGE/ -	00:00:37	10.1.0.2	GigabitEthernet1																																																																				
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																																																		
Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0																																																																			
Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	0/1																																																																			
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10.0.0.1	0	EXSTART/ -	00:00:36	10.1.0.1	GigabitEthernet1																																																																				
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Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0																																																																			
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FIX: MTU Mismatch (IOS XE)



R1	R2																																																																								
	<pre>interface GigabitEthernet1 ! Set the same IPv4 MTU (1500) as R1 ip mtu 1500 -- OR -- interface GigabitEthernet1 ! Unset IPv4 MTU, use default value (same as R1) no ip mtu</pre>																																																																								
! Showing OSPFv2 neighbors and adjacencies R1#show ip ospf neighbor <table><tr><th>Neighbor ID</th><th>Pri</th><th>State</th><th>Dead Time</th><th>Address</th><th>Interface</th></tr><tr><td>10.0.0.2</td><td>0</td><td>FULL/ -</td><td>00:00:36</td><td>10.1.0.2</td><td>GigabitEthernet1</td></tr></table> ! Showing interfaces participating in OSPFv2 R1#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.2	0	FULL/ -	00:00:36	10.1.0.2	GigabitEthernet1	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	1/1		! Showing OSPFv2 neighbors and adjacencies R2#show ip ospf neighbor <table><tr><th>Neighbor ID</th><th>Pri</th><th>State</th><th>Dead Time</th><th>Address</th><th>Interface</th></tr><tr><td>10.0.0.1</td><td>0</td><td>FULL/ -</td><td>00:00:31</td><td>10.1.0.1</td><td>GigabitEthernet1</td></tr></table> ! Showing interfaces participating in OSPFv2 R2#show ip ospf interface brief <table><tr><th>Interface</th><th>PID</th><th>Area</th><th>IP Address/Mask</th><th>Cost</th><th>State</th><th>Nbrs</th><th>F/C</th></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.2/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.1	0	FULL/ -	00:00:31	10.1.0.1	GigabitEthernet1	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1	
Neighbor ID	Pri	State	Dead Time	Address	Interface																																																																				
10.0.0.2	0	FULL/ -	00:00:36	10.1.0.2	GigabitEthernet1																																																																				
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Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0																																																																			
Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	1/1																																																																			
Neighbor ID	Pri	State	Dead Time	Address	Interface																																																																				
10.0.0.1	0	FULL/ -	00:00:31	10.1.0.1	GigabitEthernet1																																																																				
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Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0																																																																			
Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1																																																																			

TSHOOT: MTU Mismatch (Junos OS)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # Neighbor 10.0.0.2 is stuck in EXCHANGE state apnic@R1> show ospf neighbor Address Interface State ID Pri Dead 10.1.0.2 ge-0/0/0.0 Exchange 10.0.0.2 128 38 # Showing interfaces participating in OSPFv2 # 1 neighbor is seen, but no neighbor is fully adjacent apnic@R1> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 1 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DROther 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.1, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # Neighbor 10.0.0.1 is stuck in EXSTART state apnic@R2> show ospf neighbor Address Interface State ID Pri Dead 10.1.0.1 ge-0/0/0.0 ExStart 10.0.0.1 128 37 # Showing interfaces participating in OSPFv2 # 1 neighbor is seen, but no neighbor is fully adjacent apnic@R2> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 1 Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1450, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DROther 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.2, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>

TSHOOT: MTU Mismatch (Junos OS)



R1	R2
<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>	<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>
<pre># Monitor log file "OSPFV2" # No error message pop-up at R1 side apnic@R1> monitor start OSPFV2</pre>	<pre># Monitor log file "OSPFV2" # MTU mismatch between R1 and R2 apnic@R2> monitor start OSPFV2 apnic@R2> Jan 1 00:09:27.429545 OSPF packet ignored: MTU mismatch from 10.1.0.1 on intf ge- 0/0/0.0 area 0.0.0.0</pre>

FIX: MTU Mismatch (Junos OS)



R1	R2
	<pre># Set the same IPv4 MTU (1500) as R1 top set interface ge-0/0/0.0 family inet mtu 1500 -- OR -- # Unset IPv4 MTU, use default value (same as R1) top delete interface ge-0/0/0.0 family inet mtu</pre>
<pre># Showing OSPFv2 neighbors and adjacencies apnic@R1> show ospf neighbor Address Interface State ID Pri Dead 10.1.0.2 ge-0/0/0.0 Full 10.0.0.2 128 34 # Showing OSPFv2 interface ge-0/0/0.0 apnic@R1> show ospf interface ge-0/0/0.0 detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 1 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10</pre>	<pre># Showing OSPFv2 neighbors and adjacencies apnic@R2> show ospf neighbor Address Interface State ID Pri Dead 10.1.0.1 ge-0/0/0.0 Full 10.0.0.1 128 38 # Showing OSPFv2 interface ge-0/0/0.0 apnic@R2> show ospf interface interface ge-0/0/0.0 detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 1 Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10</pre>

TSHOOT: MTU Mismatch (ROS v6)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # Neighbor 10.0.0.2 is stuck in EXSTART state [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.2 address=10.1.0.2 interface=ether1 priority=1 dr-address=10.1.0.2 backup-dr-address=10.1.0.1 state="ExStart" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 # Showing interfaces participating in OSPFv2 # 1 adjacent neighbor is seen, but in fact it is stuck in EXSTART state [apnic@R1] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 used-network-type=broadcast state=backup instance=default area=backbone neighbors=1 adjacent-neighbors=1 designated-router=10.1.0.2 backup-designated-router=10.1.0.1 -- (snipped) --</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # Neighbor 10.0.0.1 is stuck in EXSTART state [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether1 priority=1 dr-address=10.1.0.2 backup-dr-address=10.1.0.1 state="ExStart" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 # Showing interfaces participating in OSPFv2 # 1 adjacent neighbor is seen, but in fact it is stuck in EXSTART state [apnic@R2] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 used-network-type=broadcast state=designated-router instance=default area=backbone neighbors=1 adjacent-neighbors=1 designated-router=10.1.0.2 backup-designated-router=10.1.0.1 -- (snipped) --</pre>

TSHOOT: MTU Mismatch (ROS v6)



R1	R2
<pre># Showing system logs that contain "ospf" topic # MTU mismatch between R1 and R2 [apnic@R1] > /log print where topics~"ospf" -- (snipped) -- 00:09:35 route,ospf,info Discarding Database Description packet on ether1 (10.1.0.1): different MTU 00:09:35 route,ospf,info mine=1500 00:09:35 route,ospf,info received=1450</pre>	<pre># Showing system logs that contain "ospf" topic # MTU mismatch between R1 and R2 [apnic@R2] > /log print where topics~"ospf" -- (snipped) -- 00:09:39 route,ospf,info Discarding Database Description packet on ether1 (10.1.0.2): too large MTU 00:09:39 route,ospf,info mine=1450 00:09:39 route,ospf,info received=1500</pre>

FIX: MTU Mismatch (ROS v6)

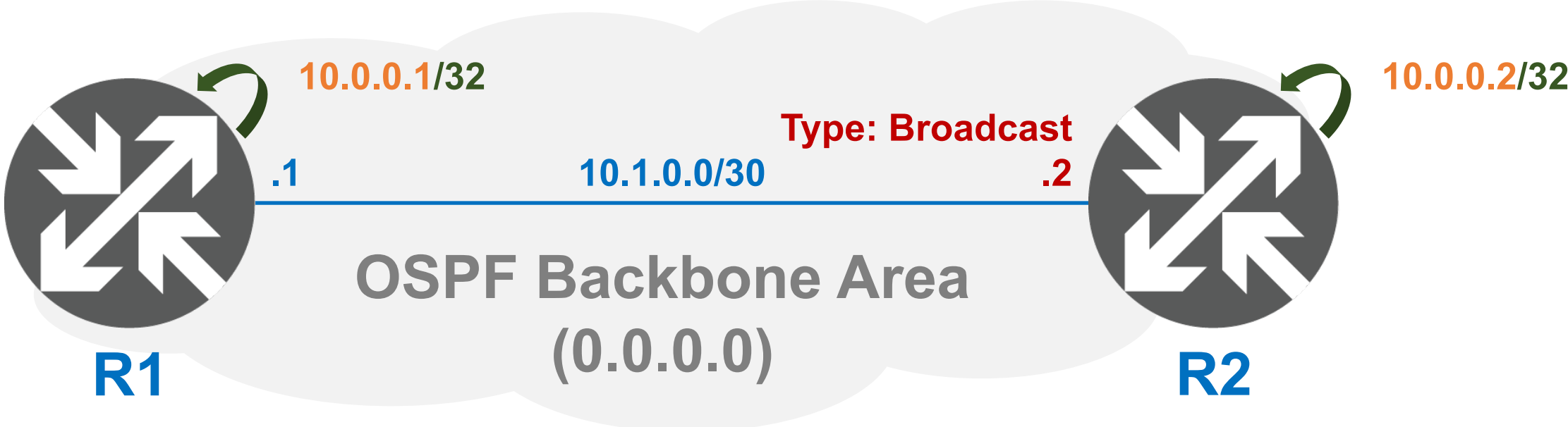


R1	R2
	<pre># Set the same Layer 3 MTU (1500) as R1 /interface ethernet set ether1 mtu=1500</pre>
<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.2 address=10.1.0.2 interface=ether1 priority=1 dr-address=10.1.0.1 backup-dr-address=10.1.0.2 state="Full" state-changes=18 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=31s # Showing OSPFv2 interface ether1 [apnic@R1] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 used-network-type=broadcast state=designated-router instance=default area=backbone neighbors=1 adjacent-neighbors=1 designated-router=10.1.0.1 backup-designated-router=10.1.0.2</pre>	<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether1 priority=1 dr-address=10.1.0.1 backup-dr-address=10.1.0.2 state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=31s # Showing OSPFv2 interface ether1 [apnic@R2] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 used-network-type=broadcast state=backup instance=default area=backbone neighbors=1 adjacent-neighbors=1 designated-router=10.1.0.1 backup-designated-router=10.1.0.2</pre>

OSPF Troubleshooting and Best Practices

Scenario 7: Network Type Mismatch

ISSUE: Network Type Mismatch



		R1	R2
OSPF Configuration			
Router ID		10.0.0.1	10.0.0.2
PTP	Area	0.0.0.0	0.0.0.0
	Type	Point-to-Point	Broadcast
	Passive	No	No
Lo	Area	0.0.0.0	0.0.0.0
	Passive	Yes	Yes

- **Issue:**
 - IOS XE / ROS v6: Neighbor is fully adjacent, routes appear in LSDB but not in routing table
 - Junos OS: Neighbor is seen, but adjacency failure is observed
- **Root Cause:**
 - Network Type mismatch between both ends of the link
- **Solution:**
 - Use the same Network Type at both ends of the link

TSHOOT: Network Type Mismatch (IOS XE)



R1							R2						
<pre>! Showing OSPFv2 neighbors and adjacencies ! Neighbor 10.0.0.2 is in FULL state R1#show ip ospf neighbor</pre>							<pre>! Showing OSPFv2 neighbors and adjacencies ! Neighbor 10.0.0.1 is in FULL state R2#show ip ospf neighbor</pre>						
Neighbor ID	Pri	State	Dead Time	Address	Interface		Neighbor ID	Pri	State	Dead Time	Address	Interface	
10.0.0.2	0	FULL/ -	00:00:39	10.1.0.2	GigabitEthernet1		10.0.0.1	1	FULL/BDR	00:00:33	10.1.0.1	GigabitEthernet1	
<pre>! Showing interfaces participating in OSPFv2 ! 1 neighbor is fully adjacent ! Network Type of GigabitEthernet1 is point-to-point R1#show ip ospf interface brief</pre>							<pre>! Showing interfaces participating in OSPFv2 ! 1 neighbor is fully adjacent ! R2 declares that it is a DR on GigabitEthernet1 R2#show ip ospf interface brief</pre>						
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs F/C	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs F/C
Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0
Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	1/1	Gi1	1	0.0.0.0	10.1.0.2/30	10	DR	1/1

TSHOOT: Network Type Mismatch (IOS XE)



R1	R2																																																								
! Showing OSPFv2 Link-State Database (LSDB) ! R1 and R2 each originated a Router LSA, while only R2 originated a Network LSA R1#show ip ospf database OSPF Router with ID (10.0.0.1) (Process ID 1) Router Link States (Area 0.0.0.0) <table><tr><th>Link ID</th><th>ADV Router</th><th>Age</th><th>Seq#</th><th>Checksum</th><th>Link count</th></tr><tr><td>10.0.0.1</td><td>10.0.0.1</td><td>41</td><td>0x80000003</td><td>0x00852E</td><td>3</td></tr><tr><td>10.0.0.2</td><td>10.0.0.2</td><td>42</td><td>0x80000003</td><td>0x00AA25</td><td>2</td></tr></table> Net Link States (Area 0.0.0.0) <table><tr><th>Link ID</th><th>ADV Router</th><th>Age</th><th>Seq#</th><th>Checksum</th></tr><tr><td>10.1.0.2</td><td>10.0.0.2</td><td>42</td><td>0x80000001</td><td>0x005BB1</td></tr></table>	Link ID	ADV Router	Age	Seq#	Checksum	Link count	10.0.0.1	10.0.0.1	41	0x80000003	0x00852E	3	10.0.0.2	10.0.0.2	42	0x80000003	0x00AA25	2	Link ID	ADV Router	Age	Seq#	Checksum	10.1.0.2	10.0.0.2	42	0x80000001	0x005BB1	! Showing OSPFv2 Link-State Database (LSDB) ! R1 and R2 each originated a Router LSA, while only R2 originated a Network LSA R2#show ip ospf database OSPF Router with ID (10.0.0.2) (Process ID 1) Router Link States (Area 0.0.0.0) <table><tr><th>Link ID</th><th>ADV Router</th><th>Age</th><th>Seq#</th><th>Checksum</th><th>Link count</th></tr><tr><td>10.0.0.1</td><td>10.0.0.1</td><td>50</td><td>0x80000003</td><td>0x00852E</td><td>3</td></tr><tr><td>10.0.0.2</td><td>10.0.0.2</td><td>49</td><td>0x80000003</td><td>0x00AA25</td><td>2</td></tr></table> Net Link States (Area 0.0.0.0) <table><tr><th>Link ID</th><th>ADV Router</th><th>Age</th><th>Seq#</th><th>Checksum</th></tr><tr><td>10.1.0.2</td><td>10.0.0.2</td><td>49</td><td>0x80000001</td><td>0x005BB1</td></tr></table>	Link ID	ADV Router	Age	Seq#	Checksum	Link count	10.0.0.1	10.0.0.1	50	0x80000003	0x00852E	3	10.0.0.2	10.0.0.2	49	0x80000003	0x00AA25	2	Link ID	ADV Router	Age	Seq#	Checksum	10.1.0.2	10.0.0.2	49	0x80000001	0x005BB1
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TSHOOT: Network Type Mismatch (IOS XE)



R1	R2
! Showing OSPF routes in IPv4 routing table ! Expected to see 10.0.0.2/32 (R2's Loopback), but no OSPF route is installed R1#show ip route ospf 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 i - IS-IS, su - IS-IS summary, 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, H - NHRP, l - LISP a - application route + - replicated route, % - next hop override, p - overrides from PfR Gateway of last resort is not set	! Showing OSPF routes in IPv4 routing table ! Expected to see 10.0.0.1/32 (R1's Loopback), but no OSPF route is installed R2#show ip route ospf 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 i - IS-IS, su - IS-IS summary, 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, H - NHRP, l - LISP a - application route + - replicated route, % - next hop override, p - overrides from PfR Gateway of last resort is not set

FIX: Network Type Mismatch (IOS XE)



R1	R2																																																
	interface GigabitEthernet1 ! Set the same Network Type (point-to-point) as R1 ip ospf network point-to-point																																																
! Showing OSPFv2 neighbors and adjacencies R1#show ip ospf neighbor	! Showing OSPFv2 neighbors and adjacencies R2#show ip ospf neighbor																																																
<table><tr><td>Neighbor ID</td><td>Pri</td><td>State</td><td>Dead Time</td><td>Address</td><td>Interface</td></tr><tr><td>10.0.0.2</td><td>0</td><td>FULL/ -</td><td>00:00:33</td><td>10.1.0.2</td><td>GigabitEthernet1</td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.2	0	FULL/ -	00:00:33	10.1.0.2	GigabitEthernet1	<table><tr><td>Neighbor ID</td><td>Pri</td><td>State</td><td>Dead Time</td><td>Address</td><td>Interface</td></tr><tr><td>10.0.0.1</td><td>0</td><td>FULL/ -</td><td>00:00:31</td><td>10.1.0.1</td><td>GigabitEthernet1</td></tr></table>	Neighbor ID	Pri	State	Dead Time	Address	Interface	10.0.0.1	0	FULL/ -	00:00:31	10.1.0.1	GigabitEthernet1																								
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! Showing interfaces participating in OSPFv2 R1#show ip ospf interface brief	! Showing interfaces participating in OSPFv2 R2#show ip ospf interface brief																																																
<table><tr><td>Interface</td><td>PID</td><td>Area</td><td>IP Address/Mask</td><td>Cost</td><td>State</td><td>Nbrs</td><td>F/C</td></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.1/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.1/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.1/30	10	P2P	1/1		<table><tr><td>Interface</td><td>PID</td><td>Area</td><td>IP Address/Mask</td><td>Cost</td><td>State</td><td>Nbrs</td><td>F/C</td></tr><tr><td>Lo0</td><td>1</td><td>0.0.0.0</td><td>10.0.0.2/32</td><td>10</td><td>LOOP</td><td>0/0</td><td></td></tr><tr><td>Gi1</td><td>1</td><td>0.0.0.0</td><td>10.1.0.2/30</td><td>10</td><td>P2P</td><td>1/1</td><td></td></tr></table>	Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C	Lo0	1	0.0.0.0	10.0.0.2/32	10	LOOP	0/0		Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1	
Interface	PID	Area	IP Address/Mask	Cost	State	Nbrs	F/C																																										
Lo0	1	0.0.0.0	10.0.0.1/32	10	LOOP	0/0																																											
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Gi1	1	0.0.0.0	10.1.0.2/30	10	P2P	1/1																																											
! Showing OSPF routes in IPv4 routing table R1#show ip route ospf	! Showing OSPF routes in IPv4 routing table R2#show ip route ospf																																																
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area -- (snipped) --	Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area -- (snipped) --																																																
Gateway of last resort is not set	Gateway of last resort is not set																																																
10.0.0.0/8 is variably subnetted, 6 subnets, 3 masks O 10.0.0.2/32 [110/20] via 10.1.0.2, 00:01:32, GigabitEthernet1	10.0.0.0/8 is variably subnetted, 6 subnets, 3 masks O 10.0.0.1/32 [110/20] via 10.1.0.1, 00:01:37, GigabitEthernet1																																																

TSHOOT: Network Type Mismatch (Junos OS)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies # No neighbor is seen apnic@R1> show ospf neighbor # Showing interfaces participating in OSPFv2 # No neighbor is seen on ge-0/0/0.0 apnic@R1> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.1, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>	<pre># Showing OSPFv2 neighbors and adjacencies # Neighbor 10.0.0.1 is stuck in INIT state apnic@R2> show ospf neighbor Address Interface State ID Pri Dead 10.1.0.1 ge-0/0/0.0 Init 10.0.0.1 128 33 # Showing interfaces participating in OSPFv2 # 1 neighbor is seen, but no neighbor is fully adjacent apnic@R2> show ospf interface detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 DR 0.0.0.0 10.0.0.2 0.0.0.0 1 Type: LAN, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 DR addr: 10.1.0.2, Priority: 128 Adj count: 0 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Cost: 10 lo0.0 DRother 0.0.0.0 0.0.0.0 0.0.0.0 0 Type: LAN, Address: 10.0.0.2, Mask: 255.255.255.255, MTU: 65535, Cost: 10 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None Protection type: None Topology default (ID 0) -> Passive, Cost: 10</pre>

TSHOOT: Network Type Mismatch (Junos OS)



R1	R2
<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>	<pre>top edit protocols ospf # Set Tracing Options output file set traceoptions file OSPFV2 # Log OSPFv2 errors set traceoptions flag error</pre>
<pre># Monitor log file "OSPFV2" # R1 is complaining configuration (Network Type) mismatch apnic@R1> monitor start OSPFV2 apnic@R1> Jan 1 00:09:19.463914 OSPF packet ignored: configuration mismatch from 10.1.0.2 on intf ge-0/0/0.0 area 0.0.0.0</pre>	<pre># Monitor log file "OSPFV2" # No error message pop-up at R2 side apnic@R2> monitor start OSPFV2</pre>

FIX: Network Type Mismatch (Junos OS)



R1	R2
	# Set the same Network Type (point-to-point) as R1 top set protocol ospf area 0.0.0.0 interface ge-0/0/0.0 interface-type p2p
<pre># Showing OSPFv2 neighbors and adjacencies apnic@R1> show ospf neighbor Address Interface State ID Pri Dead 10.1.0.2 ge-0/0/0.0 Full 10.0.0.2 128 39 # Showing OSPFv2 interface ge-0/0/0.0 apnic@R1> show ospf interface ge-0/0/0.0 detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 1 Type: P2P, Address: 10.1.0.1, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 -- (snipped) -- # Showing OSPF routes in IPv4 routing table apnic@R1> show route table inet.0 protocol ospf inet.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden) + = Active Route, - = Last Active, * = Both 10.0.0.2/32 *[OSPF/10] 00:01:35, metric 20 > to 10.1.0.2 via ge-0/0/0.0 224.0.0.5/32 *[OSPF/10] 00:11:42, metric 1 MultiRecv</pre>	<pre># Showing OSPFv2 neighbors and adjacencies apnic@R2> show ospf neighbor Address Interface State ID Pri Dead 10.1.0.1 ge-0/0/0.0 Full 10.0.0.1 128 37 # Showing OSPFv2 interface ge-0/0/0.0 apnic@R2> show ospf interface ge-0/0/0.0 detail Interface State Area DR ID BDR ID Nbrs ge-0/0/0.0 PtToPt 0.0.0.0 0.0.0.0 0.0.0.0 1 Type: P2P, Address: 10.1.0.2, Mask: 255.255.255.252, MTU: 1500, Cost: 10 Adj count: 1 -- (snipped) -- # Showing OSPF routes in IPv4 routing table apnic@R2> show route table inet.0 protocol ospf inet.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden) + = Active Route, - = Last Active, * = Both 10.0.0.1/32 *[OSPF/10] 00:01:37, metric 20 > to 10.1.0.1 via ge-0/0/0.0 224.0.0.5/32 *[OSPF/10] 00:11:46, metric 1 MultiRecv</pre>

TSHOOT: Network Type Mismatch (ROS v6)



R1	R2
<pre># Showing OSPFv2 neighbors and adjacencies ! Neighbor 10.0.0.2 is in FULL state [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.2 address=10.1.0.2 interface=ether1 priority=1 dr-address=10.1.0.2 backup-dr-address=10.1.0.1 state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=32s # Showing interfaces participating in OSPFv2 # 1 neighbor is fully adjacent, and Network Type of ether1 is point-to-point [apnic@R1] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.1 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>	<pre># Showing OSPFv2 neighbors and adjacencies ! Neighbor 10.0.0.1 is in FULL state [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=32s # Showing interfaces participating in OSPFv2 # 1 neighbor is fully adjacent, and Network Type of ether1 is point-to-point [apnic@R2] > /routing ospf interface print status Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=broadcast instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 state=designated-router instance=default area=backbone neighbors=1 adjacent-neighbors=1 designated-router=10.1.0.2 backup-designated-router=10.1.0.1 1 P interface=BR-LOOPBACK cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=default instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.0.0.2 used-network-type=broadcast state=passive instance=default area=backbone neighbors=0 adjacent-neighbors=0 designated-router=0.0.0.0 backup-designated-router=0.0.0.0</pre>

TSHOOT: Network Type Mismatch (ROS v6)



R1	R2
<pre># Showing OSPFv2 Link-State Database (LSDB) # R1 and R2 each originated a Router LSA, while only R2 originated a Network LSA [apnic@R1] > /routing ospf lsa print detail instance=default area=backbone type=router id=10.0.0.1 originator=10.0.0.1 sequence-number=0x80000003 age=46 checksum=0x7CC options="E" body= flags= link-type=Point-To-Point id=10.0.0.2 data=10.1.0.1 metric=10 link-type=Stub id=10.1.0.0 data=255.255.255.252 metric=10 link-type=Stub id=10.0.0.1 data=255.255.255.255 metric=10 instance=default area=backbone type=router id=10.0.0.2 originator=10.0.0.2 sequence-number=0x80000003 age=47 checksum=0xEFFF options="E" body= flags= link-type=Transit id=10.1.0.2 data=10.1.0.2 metric=10 link-type=Stub id=10.0.0.2 data=255.255.255.255 metric=10 instance=default area=backbone type=network id=10.1.0.2 originator=10.0.0.2 sequence-number=0x80000001 age=47 checksum=0x3DEF options="E" body= netmask=255.255.255.252 routerId=10.0.0.2 routerId=10.0.0.1</pre>	<pre># Showing OSPFv2 Link-State Database (LSDB) # R1 and R2 each originated a Router LSA, while only R2 originated a Network LSA [apnic@R2] > /routing ospf lsa print detail instance=default area=backbone type=router id=10.0.0.1 originator=10.0.0.1 sequence-number=0x80000003 age=47 checksum=0x7CC options="E" body= flags= link-type=Point-To-Point id=10.0.0.2 data=10.1.0.1 metric=10 link-type=Stub id=10.1.0.0 data=255.255.255.252 metric=10 link-type=Stub id=10.0.0.1 data=255.255.255.255 metric=10 instance=default area=backbone type=router id=10.0.0.2 originator=10.0.0.2 sequence-number=0x80000003 age=46 checksum=0xEFFF options="E" body= flags= link-type=Transit id=10.1.0.2 data=10.1.0.2 metric=10 link-type=Stub id=10.0.0.2 data=255.255.255.255 metric=10 instance=default area=backbone type=network id=10.1.0.2 originator=10.0.0.2 sequence-number=0x80000001 age=46 checksum=0x3DEF options="E" body= netmask=255.255.255.252 routerId=10.0.0.2 routerId=10.0.0.1</pre>

TSHOOT: Network Type Mismatch (ROS v6)



R1	R2
<pre># Showing OSPF routes in IPv4 routing table # Expected to see 10.0.0.2/32 (R2's Loopback), but no OSPF route is installed [apnic@R1] > /ip route print detail where ospf Flags: X - disabled, A - active, D - dynamic, C - connect, S - static, r - rip, b - bgp, o - ospf, m - mme, B - blackhole, U - unreachable, P - prohibit</pre>	<pre># Showing OSPF routes in IPv4 routing table # Expected to see 10.0.0.1/32 (R1's Loopback), but no OSPF route is installed [apnic@R2] > /ip route print detail where ospf Flags: X - disabled, A - active, D - dynamic, C - connect, S - static, r - rip, b - bgp, o - ospf, m - mme, B - blackhole, U - unreachable, P - prohibit</pre>

FIX: Network Type Mismatch (ROS v6)



R1	R2
	# Set the same Network Type (point-to-point) as R1 <code>/routing ospf interface set [find interface=ether1] network-type=point-to-point</code>
<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R1] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.2 address=10.1.0.2 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=20 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=31s # Showing OSPFv2 interface ether1 [apnic@R1] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.1 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1 # Showing OSPF routes in IPv4 routing table [apnic@R1] > /ip route print detail where ospf Flags: X - disabled, A - active, D - dynamic, C - connect, S - static, r - rip, b - bgp, o - ospf, m - mme, B - blackhole, U - unreachable, P - prohibit 0 ADo dst-address=10.0.0.2/32 gateway=10.1.0.2 gateway-status=10.1.0.2 reachable via ether1 distance=110 scope=20 target-scope=10 ospf-metric=20 ospf-type=intra-area</pre>	<pre># Showing OSPFv2 neighbors and adjacencies [apnic@R2] > /routing ospf neighbor print 0 instance=default router-id=10.0.0.1 address=10.1.0.1 interface=ether1 priority=1 dr-address=0.0.0.0 backup-dr-address=0.0.0.0 state="Full" state-changes=4 ls-retransmits=0 ls-requests=0 db-summaries=0 adjacency=35s # Showing OSPFv2 interface ether1 [apnic@R2] > /routing ospf interface print status where interface=ether1 Flags: X - disabled, I - inactive, D - dynamic, P - passive 0 interface=ether1 cost=10 priority=1 authentication=none authentication-key="" authentication-key-id=1 network-type=point-to-point instance-id=0 retransmit-interval=5s transmit-delay=1s hello-interval=10s dead-interval=40s use-bfd=no ip-address=10.1.0.2 state=point-to-point instance=default area=backbone neighbors=1 adjacent-neighbors=1 # Showing OSPF routes in IPv4 routing table [apnic@R2] > /ip route print detail where ospf Flags: X - disabled, A - active, D - dynamic, C - connect, S - static, r - rip, b - bgp, o - ospf, m - mme, B - blackhole, U - unreachable, P - prohibit 0 ADo dst-address=10.0.0.1/32 gateway=10.1.0.1 gateway-status=10.1.0.1 reachable via ether1 distance=110 scope=20 target-scope=10 ospf-metric=20 ospf-type=intra-area</pre>

OSPF Troubleshooting and Best Practices

OSPF Best Practices

- Hardcode unique Router IDs.
 - Router ID selection behaviour varies across platforms
 - IOS XE : Highest Loopback IPv4 > Highest active interface IPv4
 - Junos OS : Lowest Loopback IPv4 > Lowest physical interface IPv4
 - ROS v6 : Lowest active interface IPv4
- Manually assign OSPF interface costs.
 - Interface speed may not reflect the actual link bandwidth
 - e.g., 10GE interface with 1Gbps bandwidth vs. 1GE interface with 1Gbps bandwidth
 - Default value varies across platforms
 - IOS XE and Junos OS calculate dynamically with a reference bandwidth of 100Mbps
 - ROS v6 sets a fixed cost of 10 regardless of interface speed

OSPF Best Practices



- Set all OSPF interfaces as Passive by default.
 - Activate only interfaces that need to form adjacencies
 - Preventing unwanted OSPF adjacencies
- Enable cryptographic authentication.
 - Do not use Simple Authentication in OSPFv2
 - Preventing unauthorised OSPF adjacencies

- Use Point-to-point Network Type on router point-to-point links.
 - Avoiding unnecessary DR/BDR election
 - Reducing convergence delay during link failures
- Control DR/BDR elections by setting interface priority.
 - Assign more capable routers as DR/BDR to handle extra workload
 - Higher priority wins, with Router ID as tie breaker
 - Priority 0 prevents a router from participating in DR/BDR election

- Configure prefix suppression.
 - Eliminating unnecessary entries in LSDB and routing table
 - Improving scalability and convergence
- Carry Internet prefixes with IBGP.
 - Do not redistribute into OSPF
 - OSPF is not designed for handling global routing table
 - May cause LSDB overload and potential router crashes
- For larger networks, advertise user prefixes in IBGP.
 - Smaller LSDB, faster convergence

OSPF Best Practices



- Dual-Stack IPv4/IPv6 Deployment:
 - Greenfield (new networks):
 - Use OSPFv3 for both IPv4 and IPv6
 - RFC 5838: Support of Address Families in OSPFv3
 - Reducing operational complexity
 - Brownfield (existing IPv4 networks):
 - Keep OSPFv2 for routing IPv4
 - Run OSPFv3 exclusively for IPv6
 - Minimising impact to existing IPv4 services

OSPF Troubleshooting and Best Practices

Questions & Answers

Thank you for your attention!

Contact Me

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