



CHAPTER 1

Failure Scenarios

This chapter provides details of all failure scenarios reported by the Cisco MPLS Diagnostics Expert (MDE) 2.1.3 application for the Cisco IP Solution Center (ISC) Release 5.1. It also details IOS XR support caveats.

This chapter provides the following information:

- [1.1 Failure Scenarios, page 1-1](#)
- [1.2 IOS XR Support, page 1-20](#)

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1.1 Failure Scenarios¹

This section lists the failure scenarios reported by MDE, as follows:

- [1.1.1 Access Circuit, page 1-1](#)
- [1.1.2 MPLS Edge, page 1-9](#)
- [1.1.3 MPLS Core, page 1-15](#)
- [1.1.4 Customer Site, page 1-19](#)



Note

Each failure scenario provides a table that lists whether the failure scenario is supported by each of the five MDE test types. This table also details whether the failure scenario is supported on IOS and IOS XR.

1.1.1 Access Circuit

Access Circuit Blocking IP Connectivity

There is a blocking access list preventing IP connectivity from an access circuit interface on the provider (PE) router to the destination.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

1. Cisco MPLS Diagnostics Expert patent pending.

An Invalid PE Interface has been Specified

Interface does not exist on the PE router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	No	Yes	Yes

ATM Interface Has No VPI/VCI

An asynchronous transfer mode (ATM) access circuit interface on a PE router has no virtual path identifier (VPI), or virtual channel identifier (VCI) assigned to it, or no VPI/VCI maps to the destination IP address.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

ATM Interface Is Protocol Down

An ATM access circuit interface on a PE router is protocol down. See the [“1.2 IOS XR Support” section on page 1-20](#).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

ATM Sub-interface is Protocol Down

An ATM access circuit subinterface on a PE router is protocol down. This might be caused by incorrect subinterface parameters or by ATM Operation, Administration, and Maintenance (OAM) detecting a fault and bringing the interface down automatically. See the [“1.2 IOS XR Support” section on page 1-20](#).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Calculation of the CE Access Circuit Interface IP Address is only possible if the PE interface is not Unnumbered and has a /30 Subnet mask Interface on PE

Unable to calculate the customer edge (CE) access circuit interface IP address for the PE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

eBGP Max Prefix Exceeded for Peer

Exterior border gateway protocol (eBGP) is running between the PE and CE, however the border gateway protocol (BGP) neighbor is not established. The peer has exceeded the configured maximum number of prefixes.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

eBGP Neighbor Not Established, No Route Present

eBGP is running between the PE and CE, but the BGP Neighbor on the PE is not established. The BGP neighbor is on a different subnet from the PE and there is no route to the neighbor in the VPN routing/forwarding (VRF).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

eBGP Neighbor Not Established, Possible Misconfiguration

eBGP is running between the PE and CE, but the BGP neighbor on the PE is not established. There is a route to the BGP neighbor in the VRF and it is reachable via ping. Possible CE or PE BGP configuration problem.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

eBGP Neighbor Not Established, Route Present

eBGP is running between the PE and CE, but the BGP neighbor on the PE is not established. The BGP neighbor is on a different subnet from the PE and there is a route to the neighbor in the VRF. However, the BGP neighbor is unreachable via ping.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

EIGRP Not Exchanging Routes

The enhanced interior gateway routing protocol (EIGRP) is running between the PE and CE and a peer relationship has been established. However, no routes have been received from EIGRP on the CE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

Ethernet Interface Protocol Down

An Ethernet access circuit interface on the PE router protocol is down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Ethernet Sub-Interface Protocol Down

An Ethernet access circuit subinterface on the PE router protocol is down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Frame Relay Interface Has No DLCI

A Frame Relay access circuit interface on the PE router has no data-link connection identifier (DLCI) assigned to it, or no DLCI maps to the destination IP address.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Frame Relay Interface Protocol Down

A Frame Relay access circuit interface on the PE router protocol is down. This might be because of line parameters or cabling faults.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Frame Relay PVC Marked as Deleted

A multipoint Frame Relay permanent virtual circuit (PVC) on an access circuit interface on the PE router has no DLCI that maps to the destination IP address.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

Frame Relay PVC Marked as Deleted

A point-to-point Frame Relay PVC on an access circuit interface on the PE router has no DLCI assigned to it.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Frame Relay PVC Marked as Deleted

A Frame Relay PVC on an access circuit interface on the PE router is marked as deleted.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

Frame Relay PVC Marked as Down

A multipoint Frame Relay PVC on an access circuit interface on the PE router is marked as down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

Frame Relay PVC Marked as Down

A point-to-point Frame Relay PVC on an access circuit interface on the PE router is marked as down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Incomplete Carrier on Serial Interface

A serial access circuit interface on the PE router has an incomplete carrier.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Interface Administratively Down

An access circuit interface (or subinterface) on the PE router is administratively down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Interface Administratively Down

An access circuit subinterface on the PE router is administratively down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Interface in Protocol Down State

An access circuit interface on the PE router protocol is down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Interface on the PE is a Bundle Link Virtual-Access Interface

The interface on the PE is not a valid access circuit interface.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	No	Yes	No

Interface Operationally Down

An access circuit interface on the PE router is operationally down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Intermittent ATM Failure (to the ATM Next Hop)

ATM access circuit has intermittent ATM access to the ATM next hop. See the [“1.2 IOS XR Support” section on page 1-20](#).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Intermittent ATM Failure (to the Destination)

ATM access circuit has intermittent ATM access to the destination. See the “1.2 IOS XR Support” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Invalid Access Circuit IP Address Configuration

The CE router access circuit interface IP address is not in the same subnet as the attached PE access circuit interface IP address.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Invalid Access Circuit IP Address Configuration

The CE access circuit interface IP address is a network address.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Invalid Access Circuit IP Address Configuration

The CE access circuit interface IP address is a network broadcast address.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Invalid Access Circuit IP Address Configuration

The CE access circuit interface IP address is the same as the attached PE access circuit interface IP address.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

IP Connectivity Problem

Unknown IP connectivity issue. An access circuit connectivity problem in the VRF instance from the PE interface to the CE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
No	Yes	No	No	No	Yes	Yes

Missing Route

There is no route from the access circuit interface on the PE router to the destination.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Missing Route

There is no route from the access circuit interface on the PE router to the customer destination.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

No EIGRP Peer Relationship Established

The EIGRP is running between the PE and CE, however no peer relationship has been established.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

No EIGRP Peer Relationship Established

The routing protocol EIGRP is running between the PE and CE. The PE and CE interfaces are on different subnets and are not using IP unnumbered. No peer relationship has been established as the PE and CE are on different subnets.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

No OSPF Peers

Open shortest path first (OSPF) is running between the PE and CE, but no peer exists on the PE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

No Routing Protocol has been Determined Running between the PE and CE and no Static Route is Present

An access circuit connectivity problem in VRF.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

OSPF Not Exchanging Routes

OSPF is running between the PE and CE, but a peer relationship has been established. However, no routes have been received from OSPF on the CE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

OSPF Peers Not Established

OSPF is running between the PE and CE, but a peer relationship has not been established.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

OSPF Peers Not Established

OSPF is running between the PE and CE. However, a peer relationship has not been established as PE and CE interfaces are on different subnets and are not using IP unnumbered.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

PE has No Route to CE

Connected PE and CE interfaces are on different subnets. No routing protocol has been determined running between the PE and CE and no static route to the CE is present.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

RIB Failure

A route from the PE to a destination in a VRF has not been installed in the VRF routing table. This has been identified as a Routing Information Base (RIB) failure.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	No	Yes	No

RIP Misconfiguration

Routing information protocol (RIP) is running between the PE and CE, but no routes have been received from RIP on the CE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

RIP Not Exchanging Routes

RIP is running between the PE and CE, but no routes have been received from RIP on the CE as the PE and CE interfaces are on different subnets and are not using IP unnumbered.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

Serial Interface in Loopback Mode

A serial access circuit interface on the PE router is configured in loopback mode.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Serial Interface Operationally Down

A serial access circuit interface on the PE router is operationally down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Static IP address on ATM Point-to-Point Interface

ATM access circuit has a static IP address mapping on an ATM point-to-point subinterface. Neither a static mapping nor an address resolution protocol (ARP) are required on a point-to-point subinterface because there is a single VC and a single path for the traffic. See the “1.2 IOS XR Support” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Sub-interface in Protocol Down State

An access circuit subinterface on the PE router protocol is down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Undiagnosed ATM Failure (ATM Pings Failed but the ATM Segment Ping Succeeded)

ATM access circuit connection is broken. The end-to-end ATM ping failed, but the ATM segment ping succeeded. This might be caused by various issues such as incorrect ATM line parameters, misconfigured ATM routing, CE or ATM cloud interfaces being down, or devices being down. See the “1.2 IOS XR Support” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Undiagnosed ATM Failure (End to End and Segment ATM Pings Failed)

ATM access circuit connection is broken. Both the end-to-end and segment ATM pings failed. This might be caused by various issues such as incorrect ATM line parameters, misconfigured ATM routing on the ATM next hop, next hop interfaces being down, or devices being down. See the 1.2 IOS XR Support, page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Virtual Template Interface has been Specified for the PE Access Circuit Interface

The PE interface on the PE is not a valid access circuit interface.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	No	Yes	No

1.1.2 MPLS Edge

BGP Next Hop Interface Admin Down

BGP next hop on PE is assigned to a loopback interface. However, that interface is administratively down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

BGP Next Hop is Not Assigned to an Interface

The BGP next hop for routes to the remote site PE is not assigned to an interface on the remote PE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

BGP Not Active

BGP is not active on the PE router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	No	Yes	Yes

BGP Peers Using Same BGP Next Hop

BGP VPNv4 peers use the same BGP next hop. This prevents correct route distribution of PE routes. Other routing problems might also be encountered.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

BGP Peers Using Same Router Identifier (RID)

BGP VPNv4 peers use the same router identifier. This prevents correct route distribution of PE routes. Other routing problems might also be encountered.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

BGP to LFIB Mismatch

Untagged entry has mismatch between BGP and label forwarding information base (LFIB) tables.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	No	Yes	Yes

BGP to FIB Mismatch

The forwarding information base (FIB) and BGP entries are inconsistent.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	No	Yes	Yes

Duplicate BGP Next Hop

Duplicate IP address found in the network for the BGP next hop on PE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

Duplicate IP Address

There is a duplicate IP address configured on the PE router that conflicts with an access circuit interface.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Duplicate IP Address

Duplicate IP address found in the network for the BGP router identifier on PE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

eBGP not Redistributing Connected Routes into MP-BGP

The routing protocol eBGP is running between the PE and CE, but eBGP on the PE is not redistributing connected routes into Multi Protocol (MP)-BGP.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

FIB to LFIB Mismatch

Aggregate entry has mismatch between FIB and LFIB tables.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Ingress FIB to Egress LFIB Mismatch

Egress LFIB and Ingress FIB inconsistency.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	No	Yes	Yes

Inconsistent BGP Entries

BGP entries are inconsistent for the VRF.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	No	Yes	Yes

IP Unnumbered Borrowed Interface Administratively Down

The interface from which an IP address is borrowed for an IP unnumbered interface on the PE router is administratively down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Missing Router Identifier (RID)

Unable to determine the local router identifier on the PE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
No	No	No	No	Yes	Yes	Yes

Missing VPNv4 Address Family Configuration

VPNv4 configuration missing; Virtual private network (VPN) label exchange problem. VPNv4 address family configuration missing from BGP router configuration on the PE router. This results in routes being dropped.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

MPLS LDP Package not enabled on IOS XR Router

The MPLS LDP package is not enabled on the IOS XR router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	No	Yes

MPLS Package installed but not active on IOS XR Router

The MPLS package is installed, but it is not active on the IOS XR router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	No	Yes

MPLS Package not installed on IOS XR Router

The MPLS package is not installed on the IOS XR router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	No	Yes

MPLS Troubleshooting is Only Possible on Cisco Devices in the ISC Inventory

Label-switched path (LSP) connectivity failure lies between the upstream neighbor and the remote PE. Unable to log in to the device to localize further, as it is not present in ISC inventory (it is potentially a non-Cisco device).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

No MP-BGP Neighbors

There are no MP-BGP neighbors defined on the PE router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

No MP-BGP Neighbor Session Established

No MP-BGP neighbor session established on the PE router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

No VPN Label For Prefix

No VPN label has been allocated for the prefix.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

No VRF Associated with IP Unnumbered Borrowed Interface

The interface from which an IP address is borrowed for an IP unnumbered interface on the PE router has no VRF associated.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

No VRF Associated with PE Interface

An interface on the PE router has no VRF associated.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

OSPF Loopback Interface Uses A Non /32 Netmask

VPNv4 routes are being advertised to IBGP neighbors by the PE. The address of the next hop is a loopback interface that does not have a /32 mask defined. OSPF is being used on this loopback interface, and the OSPF network type of this interface is loopback. OSPF advertises this IP address as a host route (with mask /32), regardless of what mask is configured. This advertising conflicts with TDP/LDP, that uses configured masks, so the TDP/LDP neighbors might not receive a label for the routes advertised by this router. This condition could break connectivity between sites that belong to the same VPN.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

PE Interface Has No IP Address

An interface on the PE router has no IP address.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

Router ID Loopback Interface Down

The loopback interface used to assign the local router ID on the PE is administratively down.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Routes not Redistributed to or from MP-BGP

Routes are not being redistributed to or from MP-BGP on the PE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	No

Routing Protocol eBGP is running between PE and CE and is not Redistributing Connected Routes into MP-BGP

VPN connectivity problem in VRF to destination.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

Static Route to Remote Prefix

A static route to a remote prefix has been configured within a VRF on the PE.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

Traffic Administratively Blocked

VPN connectivity problem from the PE to the destination due to traffic being administratively blocked.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	No	No	Yes	Yes

Troubleshooting of the Layer 3 VPN has been Unable to Find the Cause of the Failure

LSP connectivity problem.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

Troubleshooting of the Layer 3 VPN has been Unable to Find the Cause of the Failure

VPN connectivity problem in VRF from PE to destination.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

VRF Route Target Import/Export Mismatch

VRF route target import/export mismatch between the PE devices.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

1.1.3 MPLS Core

An Invalid PE Interface has been Specified

Interface supplied as the LSP Endpoint does not exist on the PE router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
No	No	No	No	Yes	Yes	Yes

Broken LDP Neighbor Session

LDP session with downstream neighbor broken. Route processor/line card forwarding discrepancy on the router. See the [“1.2 IOS XR Support” section on page 1-20](#).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

CEF Not Enabled On Router

CEF has not been enabled on a router. See the [“1.2 IOS XR Support” section on page 1-20](#).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

Distributed LFIB Table Discrepancy

There is a discrepancy in the LFIB table between the route processor and line cards.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

Distributed FIB Table Discrepancy

There is a discrepancy in the FIB table between the route processor and line cards.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	No	Yes	Yes

Label Inconsistency

LFIB local tag, received packet, and LDP local binding label inconsistent on the router. See the [“1.2 IOS XR Support” section on page 1-20](#).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

LDP Host Not Reachable

The host is not reachable from the label switch router (LSR). This could be caused by no LDP session on router for the downstream router, LDP ID not reachable because of IGP problem, ACL configured that is blocking LDP packets, or an authentication problem.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

LDP Label Mismatch

Label received for a prefix did not match the label sent. See the “1.2 IOS XR Support” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

LDP Neighbors Not Discovered

LDP neighbors have not been discovered. Generic LDP discovery problem found on an interface of the device with its downstream neighbor. See the “1.2 IOS XR Support” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

LDP Neighbors Not Discovered

LDP neighbors have not been discovered. An interface on a router has an ACL configured that could be preventing LDP neighbor discovery.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

LDP Neighbors Not Established

LSP connectivity problem, control plane issue. The LDP session is not established. The interface has an ACL configured that could be blocking LDP session establishment on port 646.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

LDP/TDP Mismatch

LDP and TDP have been enabled on opposite ends of a link. See the “1.2 IOS XR Support” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

LSP Reply Path Problem

LSP connectivity problem with the reply path. See the “[1.2 IOS XR Support](#)” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

LSP Visualization

LSP is displayed, but is incomplete. Failures could have occurred since the previous MPLS VPN Connectivity Verification test was run.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

Missing LFIB Entry

LFIB entry missing. Could be because of misrouting in an earlier router, or due to duplicate loopbacks. See the “[1.2 IOS XR Support](#)” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

Missing or Untagged Return Path

Return path from the core router absent or untagged for the prefix. See the “[1.2 IOS XR Support](#)” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

MPLS Label Space Exhausted

MPLS label space exhausted on a router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

MPLS Not Enabled Globally

MPLS has not been enabled globally on router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

MPLS Not Enabled On Interface

MPLS has not been enabled on an interface. See the “[1.2 IOS XR Support](#)” section on page 1-20.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

No Entry for Label

No entry in LFIB for incoming label going to the destination prefix. See the [“1.2 IOS XR Support” section on page 1-20](#).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

No LDP Session with Neighbor

No LDP session on router exists with neighbor.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

No Valid Next-Hop Entry

No valid entry can be found for the next-hop from the current device. See the [“1.2 IOS XR Support” section on page 1-20](#).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

Routing Loop In Forwarding Path

A routing loop is present in the forwarding path.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

Tag Advertising Not Enabled

tag-switching advertise-tags is not enabled on router.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

Tag Advertising Possibly Denied by ACL

tag-switching advertise-tags has been globally disabled, but selectively enabled for one or more access lists. The ACLs might be denying the advertising of tags to the destination prefix.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

TTL Propagation Disabled

Could not troubleshoot or detect failure point because the device is not propagating the Time To Live (TTL).

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

Tunnel Connectivity Failure

Unknown MPLS TE connectivity problem.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

Tunnel Connectivity Failure No Targeted LDP Configuration

LDP discovery failure for the neighbor devices. The tunnel tail end device is not accepting LDP targeted hellos.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

Unable to Troubleshoot MPLS TE Connectivity Problem

Router is running a non-OAM Cisco IOS version. The connectivity of the tunnel cannot be tested.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

Unknown LSP Connectivity Problem

LSP connectivity problem, data plane issue, or unknown cause.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	Yes

Unsupported IOS Version

Core router running an unsupported IOS version. This version of IOS does not support the required OAM functionality.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	No	Yes	Yes	Yes	Yes	No

VPN Connectivity Tests have been Exercised and No Failures Found (However as Pings are Blocked to the CE, it is Not Possible to Verify VPN Connectivity)

Unable to verify VPN connectivity in VRF from PE to destination.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	Yes	Yes	Yes	Yes

1.1.4 Customer Site

Possible Customer Routing Issue

The PE has some routes from the CE, but the CE is unable to respond to pings.

CE to CE	PE to Attached CE	CE to PE Across Core	PE to PE (in VRF)	PE to PE Core	IOS	IOS XR
Yes	Yes	Yes	No	No	Yes	Yes

1.2 IOS XR Support

This section details the IOS XR support caveats:

1. [MPLS Not Enabled On Interface, page 1-17](#)

IOS XR has the concept of packages. One of the packages relevant to MDE is the MPLS package. When MDE troubleshooting focuses on an IOS XR router in the core, various preparation checks are carried out to ensure that the router is configured sufficiently; that is, that the MPLS package is installed and active, and then to check for the required features being enabled (MPLS OAM and MPLS LDP). If any of these checks fail, a failure scenario is reported. [MPLS Not Enabled On Interface, page 1-17](#) remains valid for IOS devices, or when MPLS is disabled on an interface on an IOS XR device.

2. [CEF Not Enabled On Router, page 1-15](#)

It is still possible for MDE to determine cases where CEF is disabled on IOS routers in the core, for example, CEF could be disabled via CLI configuration, or when the router is overloaded and shuts itself down. In such cases, the IOS CLI command **show cef state** reports that CEF is either *enabled/running* or *disabled/not running*, and MDE can determine that CEF is disabled.

CEF cannot be disabled on an IOS XR router. When the CEF switching feature on an IOS XR router becomes overloaded, it does not shut down. Instead, it applies back pressure to the queue of outstanding requests in an effort to reduce the load on the CEF switching process. Therefore, in an IOS XR router, the relevant CLI **show** command does not report that CEF is nonoperational, and thus this failure scenario is not valid on an IOS XR router.

3. [LDP/TDP Mismatch, page 1-16](#)

This is not a valid scenario where directly connected IOS XR routers are present, because IOS XR only supports a single label distribution protocol – that is LDP. It is possible for the application to find LDP-TDP mismatch if it is configured in IOS-IOS XR, IOS XR-IOS, or IOS-IOS configurations.

4. [Broken LDP Neighbor Session, page 1-15](#)

[Label Inconsistency, page 1-15](#)

[LDP Label Mismatch, page 1-16](#)

[LDP Neighbors Not Discovered, page 1-16](#)

[LSP Reply Path Problem, page 1-17](#)

[Missing LFIB Entry, page 1-17](#)

[Missing or Untagged Return Path, page 1-17](#)

[No Entry for Label, page 1-18](#)

[No Valid Next-Hop Entry, page 1-18](#)

These failure scenarios are due to specific bugs in IOS versions, and are not applicable to IOS XR.

5. [ATM Interface Is Protocol Down, page 1-2](#)

[ATM Sub-interface is Protocol Down, page 1-2](#)

[Intermittent ATM Failure \(to the ATM Next Hop\), page 1-5](#)

[Intermittent ATM Failure \(to the Destination\), page 1-6](#)

[Static IP address on ATM Point-to-Point Interface, page 1-9](#)

[Undiagnosed ATM Failure \(ATM Pings Failed but the ATM Segment Ping Succeeded\), page 1-9](#)

[Undiagnosed ATM Failure \(End to End and Segment ATM Pings Failed\), page 1-9](#)

These are ATM failure scenarios, and because IOS XR currently does not support ATM interfaces on the CRS-1, they are not applicable for the CRS-1 platform. However, they continue to be applicable on IOS devices and for IOS XR on the Cisco 12000 XR Series.

