CHAPTER 5

Prime Diagnostics Overview

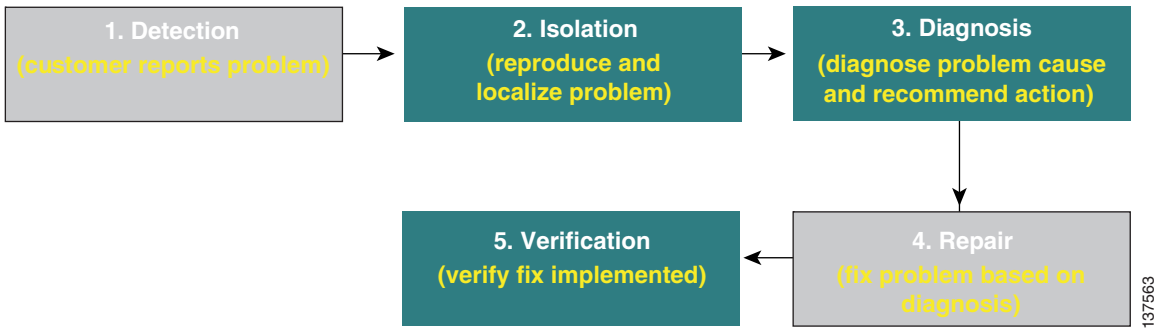
Prime Diagnostics is an automated, workflow-based network management application that troubleshoots and diagnoses problems in Multiprotocol Label Switching (MPLS) VPNs. Prime Diagnostics offers users the capability to reduce the amount of time required to diagnose MPLS-related network outages—in many cases from hours to minutes. It performs diagnostics based on analysis of network failure scenarios, across MPLS access, edge, and core networks. It is equally applicable to both service provider and enterprise "self-deployed" MPLS VPN networks. Network operations center (NOC) support technicians as well as second-line and third-line support can benefit from this product. Prime Diagnostics optionally integrates with the Prime Fulfillment MPLS VPN provisioning component. To diagnose MPLS VPN core problems, Cisco IOS and IOS XR software releases supporting MPLS operations and maintenance (OAM) features including label-switched path (LSP) ping and LSP traceroute are required.

In effective fault finding and troubleshooting, there are five steps:

1. Detection
2. Isolation
3. Diagnosis
4. Repair
5. Verification

Prime Diagnostics is designed to support reactive situations in which an end customer reports a problem with their VPN service. This is essentially the Detection step in Figure 5-1. The Repair function is not supported because many providers prefer to be in complete control of any changes made to router devices and might have specific in-house procedures for doing so.

Figure 5-1 The Reactive Fault Lifecycle



Note Steps 2, 3, and 5 are performed by Prime Diagnostics. Steps 1 and 4 must be performed manually.

Prime Diagnostics focuses on the Isolation, Diagnosis, and Verification steps. It provides invaluable functionality for isolating and diagnosing failures in the network, determining the device(s) at fault, and checking appropriate device status and configuration to determine the likely reason for the failure. Prime Diagnostics also provides the ability to rerun tests to verify that changes made to the device configuration have resolved the issue.

The functionality can be used on its own, without any dependency on any other modules in Prime Fulfillment (for example, VPN provisioning or Traffic Engineering Management). It can also be used in Prime Fulfillment installations where some or all of the other Prime Fulfillment modules are used. If the MPLS VPN Provisioning functionality is used, then Customer and VPN data can be used as a starting point for troubleshooting, to locate the endpoints (for example, Customer Edge devices) between which connectivity is tested.

In addition to troubleshooting, Prime Diagnostics can also be used for VPN post-provisioning checks. After deploying a VPN, either manually or using Prime Fulfillment VPN provisioning, a connectivity test can be run to verify that the VPN has been provisioned successfully.

Note Prime Diagnostics does not have any support for underlying configuration or routing changes during troubleshooting. During the execution of Prime Diagnostics, any changes made either by the operator or through the control plane of the routers, will not be reflected in the actual troubleshooting performed. Prime Diagnostics does not guarantee that the correct Failure Scenario or observation will be found in cases where such changes are made.

IPv6

The IPv4 address free pool held by the Internet Assigned Numbers Authority (IANA) is running out. Cisco is addressing this shortage by adopting IPv6 addressing.

Prime Diagnostics supports configuration and selection of devices with both IPv4 and IPv6 addresses. Prime Diagnostics can troubleshoot MPLS VPN services where the attachment circuits:

- use IPv6 addressing
- use dual stack IPv4/IPv6 addressing.

Dual stack is a technique that allows both IPv4 and IPv6 to coexist on the same interfaces. For many years, if not forever, there will be a mix of IPv6 and IPv4 nodes on the Internet. Thus compatibility with the large installed base of IPv4 nodes is crucial for the success of the transition from IPv4 to IPv6. For example, a single interface can be configured with an IPv4 address and an IPv6 address. All the elements referenced as dual-stacked, such as provider edge and customer edge routers, run IPv4 as well as IPv6 addressing and routing protocols.

Note Prime Diagnostics supports only global unicast IPv6 addresses. A global unicast address is very similar in function to an IPv4 unicast address such as 131.107.1.100. In other words, these addresses are conventional and publicly routable addresses. A global unicast address includes a global routing prefix, a subnet ID, and an interface ID.

Table 5-1 General Unicast Address Structure

Fields	Network prefix	Subnet	Interface Identifier
Bits	48	16	64

Note Prime Diagnostics permits to launch a test where both attachment circuit endpoints are either IPv6 and IPv6 or IPv4 and IPv4. No mixed addressing formats can be specified

For more details about when a test is initiated on an IPv6 address, see Cisco Prime Fulfillment User Guide 6.2.