

Chapter 3

Work with Problems on Your Network

This chapter describes how to work with problems on your network. It discusses troubleshooting basics, using an example network, and includes the commands you might use to diagnose problems with the router and network.

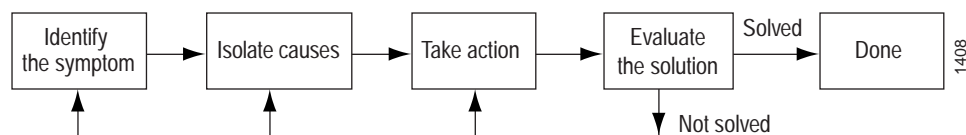
Table 15: Checklist for Working with Problems on Your Network

Work with Problems on Your Network Tasks	Command or Action
Isolate a Broken Network Connection on page 30	
1. Identify the Symptoms on page 31	ping (<i>ip-address</i> <i>hostname</i>) show route (<i>ip-address</i> <i>hostname</i>) tracertoute (<i>ip-address</i> <i>hostname</i>)
2. Isolate the Causes on page 32	show < configuration interfaces protocols route >
3. Take Appropriate Action on page 33	[edit] delete routing options static route <i>destination-prefix</i> commit and-quit show route <i>destination-prefix</i>
4. Evaluate the Solution on page 34	show route (<i>ip-address</i> <i>hostname</i>) ping (<i>ip-address</i> <i>hostname</i>) count 3 tracertoute (<i>ip-address</i> <i>hostname</i>)

Isolate a Broken Network Connection

Purpose By applying the standard four-step process illustrated in Figure 5, you can isolate a failed node in the network.

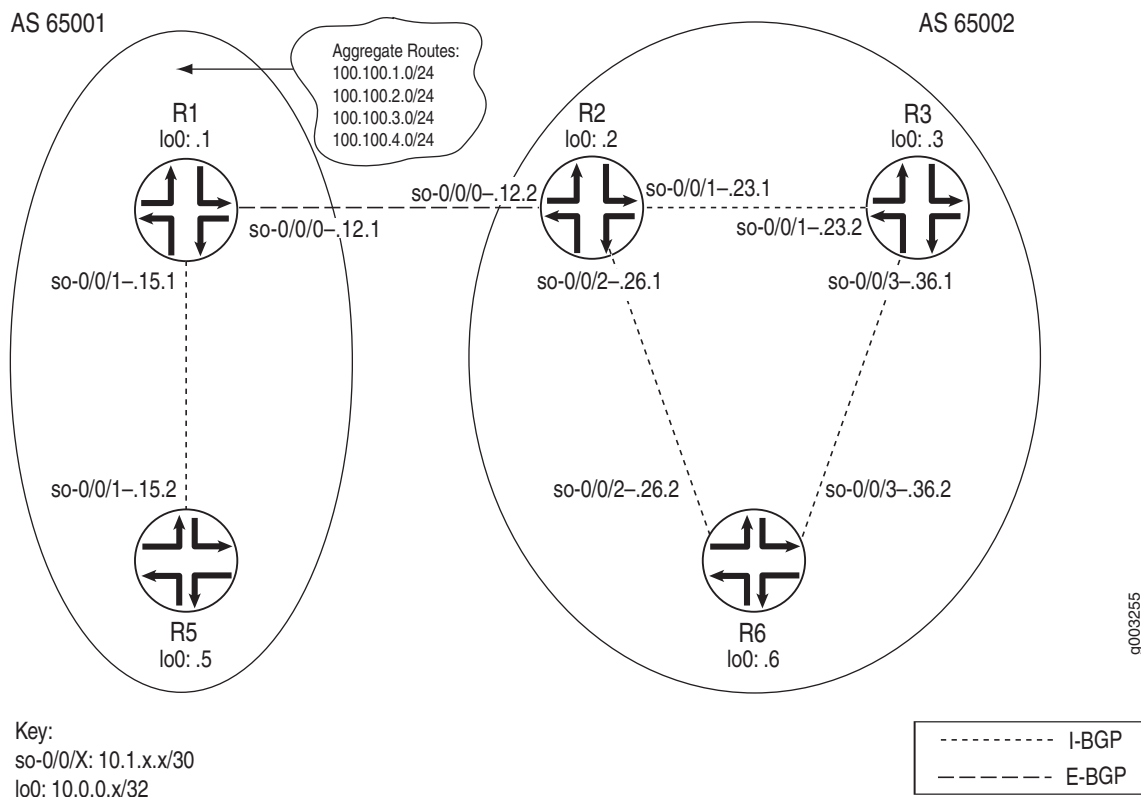
Figure 5: Process for Diagnosing Problems in Your Network



Before you embark on the four-step process, however, it is important that you are prepared for the inevitable problems that occur on all networks. While you might find a solution to a problem by simply trying a variety of actions, you can reach an appropriate solution more quickly if you are systematic in your approach to the maintenance and monitoring of your network. To prepare for problems on your network, understand how the network functions under normal conditions, have records of baseline network activity, and carefully observe the behavior of your network during a problem situation.

Figure 6 shows the network topology used in this section to illustrate the process of diagnosing problems in a network.

Figure 6: Network with a Problem



The network in Figure 6 consists of two autonomous systems (ASs). AS 65001 includes two routers, and AS 65002 includes three routers. The border router (R1) in AS 65001 announces aggregated prefixes **100.100/24** to the AS 65002 network. The problem in this network is that **R6** does not have access to **R5** because of a loop between **R2** and **R6**.

Steps To Take To isolate a failed connection in your network, follow these steps:

1. Identify the Symptoms on page 31
2. Isolate the Causes on page 32
3. Take Appropriate Action on page 33
4. Evaluate the Solution on page 34

Step 1: Identify the Symptoms

Purpose The symptoms of a problem in your network are usually quite obvious, such as the failure to reach a remote host.

Action To identify the symptoms of a problem on your network, start at one end of your network and follow the routes to the other end, entering all or one of the following JUNOS command-line interfaces (CLI) operational mode commands:

```
user@host> ping (ip-address | host-name)
user@host> show route (ip-address | host-name)
user@host> traceroute (ip-address | host-name)
```

Sample Output

```
user@R6> ping 10.0.0.5
PING 10.0.0.5 (10.0.0.5): 56 data bytes
36 bytes from 10.1.26.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
 4 5 00 0054 e2db 0 0000 01 01 a8c6 10.1.26.2 10.0.0.5

36 bytes from 10.1.26.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
 4 5 00 0054 e2de 0 0000 01 01 a8c3 10.1.26.2 10.0.0.5

36 bytes from 10.1.26.1: Time to live exceeded
Vr HL TOS Len ID Flg off TTL Pro cks Src Dst
 4 5 00 0054 e2e2 0 0000 01 01 a8bf 10.1.26.2 10.0.0.5

^C
--- 10.0.0.5 ping statistics ---
3 packets transmitted, 0 packets received, 100% packet loss

user@R6> show route 10.0.0.5

inet.0: 20 destinations, 20 routes (20 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.5/32          *[IS-IS/165] 00:02:39, metric 10
                    > to 10.1.26.1 via so-0/0/2.0

user@R6> traceroute 10.0.0.5
traceroute to 10.0.0.5 (10.0.0.5), 30 hops max, 40 byte packets
 1 10.1.26.1 (10.1.26.1) 0.649 ms 0.521 ms 0.490 ms
```

```

2 10.1.26.2 (10.1.26.2) 0.521 ms 0.537 ms 0.507 ms
3 10.1.26.1 (10.1.26.1) 0.523 ms 0.536 ms 0.514 ms
4 10.1.26.2 (10.1.26.2) 0.528 ms 0.551 ms 0.523 ms
5 10.1.26.1 (10.1.26.1) 0.531 ms 0.550 ms 0.524 ms

```

What It Means The sample output shows an unsuccessful **ping** command in which the packets are being rejected because the time to live is exceeded. The output for the **show route** command shows the interface (10.1.26.1) that you can examine further for possible problems. The **traceroute** command shows the loop between 10.1.26.1 (R2) and 10.1.26.2 (R6), as indicated by the continuous repetition of the two interface addresses.

Step 2: Isolate the Causes

Purpose A particular symptom can be the result of one or more causes. Narrow down the focus of your search to find each individual cause of the unwanted behavior.

Action To isolate the cause of a particular problem, enter one or all of the following JUNOS CLI operational mode command:

```
user@host> show < configuration | bgp | interfaces | isis | ospf | route >
```

Your particular problem may require the use of more than just the commands listed above. See the appropriate command reference for a more exhaustive list of commonly used operational mode commands.

Sample Output

```

user@R6> show interfaces terse
Interface      Admin Link Proto Local Remote
so-0/0/0       up    up    inet  10.1.56.2/30
so-0/0/0.0     up    up    inet  10.1.56.2/30
                iso
so-0/0/2       up    up    inet  10.1.26.2/30
so-0/0/2.0     up    up    inet  10.1.26.2/30
                iso
so-0/0/3       up    up    inet  10.1.36.2/30
so-0/0/3.0     up    up    inet  10.1.36.2/30
                iso
[...Output truncated...]

```

The following sample output is from R2:

```

user@R2> show route 10.0.0.5

inet.0: 22 destinations, 25 routes (22 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.5/32      *[Static/5] 00:16:21
                  > to 10.1.26.2 via so-0/0/2.0
                  [BGP/170] 3d 20:23:35, MED 5, localpref 100
                  AS path: 65001 I
                  > to 10.1.12.1 via so-0/0/0.0

```

What It Means The sample output shows that all interfaces on R6 are up. The output from R2 shows that a static route [Static/5] configured on R2 points to R6 (10.1.26.2) and is the preferred route to R5 because of its low preference value. However, the route is looping from R2 to R6, as indicated by the missing reference to R5 (10.1.15.2).

Step 3: Take Appropriate Action

Purpose The appropriate action depends on the type of problem you have isolated. In this example, a static route configured on R2 is deleted from the [routing-options] hierarchy level. Other appropriate actions might include the following:

- Check the local router's configuration and edit it if appropriate.
- Troubleshoot the intermediate router.
- Check the remote host configuration and edit it if appropriate.
- Troubleshoot routing protocols.
- Identify additional possible causes.

Action To resolve the problem in this example, enter the following JUNOS CLI commands:

```
[edit]
user@R2# delete routing-options static route destination-prefix
user@R2# commit and-quit
user@R2# show route destination-prefix
```

Sample Output

```
[edit]
user@R2# delete routing-options static route 10.0.0.5/32

[edit]
user@R2# commit and-quit
commit complete
Exiting configuration mode

user@R2> show route 10.0.0.5

inet.0: 22 destinations, 24 routes (22 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.5/32          *[BGP/170] 3d 20:26:17, MED 5, localpref 100
                    AS path: 65001 I
                    > to 10.1.12.1 via so-0/0/0.0
```

What It Means The sample output shows the static route deleted from the [routing-options] hierarchy and the new configuration committed. The output for the **show route** command now shows the BGP route as the preferred route, as indicated by the asterisk (*).

Step 4: Evaluate the Solution

Purpose If the problem is solved, you are finished. If the problem remains or a new problem is identified, start the process over again.

You can address possible causes in any order. In relation to the network in Figure 6, we chose to work from the local router toward the remote router, but you might start at a different point, particularly if you have reason to believe that the problem is related to a known issue, such as a recent change in configuration.

Action To evaluate the solution, enter the following JUNOS CLI commands:

```
user@host> show route (ip-address | host-name)
user@host> ping (ip-address | host-name)
user@host> traceroute (ip-address | host-name)
```

Sample Output user@R6> show route 10.0.0.5

```
inet.0: 20 destinations, 20 routes (20 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.0.0.5/32          *[BGP/170] 00:01:35, MED 5, localpref 100, from 10.0.0.2
                     AS path: 65001 I
                     > to 10.1.26.1 via so-0/0/2.0
```

```
user@R6> ping 10.0.0.5
PING 10.0.0.5 (10.0.0.5): 56 data bytes
64 bytes from 10.0.0.5: icmp_seq=0 ttl=253 time=0.866 ms
64 bytes from 10.0.0.5: icmp_seq=1 ttl=253 time=0.837 ms
64 bytes from 10.0.0.5: icmp_seq=2 ttl=253 time=0.796 ms
^C
--- 10.0.0.5 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.796/0.833/0.866/0.029 ms
```

```
user@R6> traceroute 10.0.0.5
traceroute to 10.0.0.5 (10.0.0.5), 30 hops max, 40 byte packets
 1 10.1.26.1 (10.1.26.1) 0.629 ms 0.538 ms 0.497 ms
 2 10.1.12.1 (10.1.12.1) 0.534 ms 0.538 ms 0.510 ms
 3 10.0.0.5 (10.0.0.5) 0.776 ms 0.705 ms 0.672 ms
```

What It Means The sample output shows that there is now a connection between R6 and R5. The `show route` command shows that the BGP route to R5 is preferred, as indicated by the asterisk (*). The `ping` command is successful and the `traceroute` command shows that the path from R6 to R5 is through R2 (10.1.26.1), and then through R1 (10.1.12.1).