Troubleshooting ISO CLNS

This chapter presents protocol-related troubleshooting information for ISO Connectionless Network Services (CLNS) protocol connectivity and performance problems. ISO CLNS is a network layer standard that is part of the OSI protocol suite.

Note   Discussions of host configuration problems in this chapter assume that the host is a UNIX system. Equivalent actions might also be applicable to non-UNIX hosts, but the discussions do not specifically address non-UNIX end-station problems.

The sections in this chapter describe specific ISO CLNS symptoms, the problems that are likely to cause each symptom, and the solutions to those problems.

- Host Cannot Access Hosts on Local or Remote Network

- Host Cannot Access Hosts in Same Area

- Host Cannot Access Hosts in Different Area

- Connections Fail Using Certain Protocols

- Users Cannot Make Connections over Parallel Path

- Redistribution Causes Routing Problems

- Poor Performance

Host Cannot Access Hosts on Local or Remote Network

Symptom: Hosts cannot communicate with other hosts. Hosts might be located on the local or a remote network. Connections to some hosts on a network might be possible while connections to other hosts on the same network fail.

Table 10-1 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 10-1   ISO CLNS: Host Cannot Access Hosts on Local or Remote Network

Possible Problem	Solution	
Missing or misconfigured default gateway specification	**Step 1**	Determine whether a default gateway is specified in the adjacency table of the host attempting to make a connection. Use the following UNIX command: `host% netstat -rn` Check the output of this command for a default gateway specification.
	Step 2	If the default gateway specification is incorrect, or if it is not present at all, you can change or add a default gateway using the following UNIX command at the local host: `host% route add default address 1` where *address* is the IP address of the default gateway (the router local to the host). The value 1 indicates that the specified gateway is one hop away.
	Step 3	It is recommended that you specify a default gateway as part of the boot process. Specify the ISO CLNS address of the gateway in the following UNIX host file: */etc/defaultrouter* This filename might be different on your UNIX system.
End system has no Level 1 router	**Step 1**	Use the **show clns neighbors detail** privileged EXEC command to show all ESs[1] and ISs[2] to which the router is directly connected.
	Step 2	Make sure that there is at least one Level 1 router on the same network as the end system.
Level 1 router or ES has bad address	**Step 1**	Verify that the Level 1 router has the same address as the ES.
	Step 2	Verify that all bytes of the NSAP address, up to but not including the system ID, are the same on both the router and the ES. The domain and area addresses must match, and the station IDs must be unique. (The value of the n-selector byte has no impact.)
ES host is not running ES-IS[3] protocol	**Step 1**	Use the appropriate host commands to verify that an ES-IS process is running. If necessary, initiate the ES-IS process on the host.
	Step 2	Check the adjacency database on the host and verify that it has an entry for its directly connected router.
	Step 3	Use the **debug clns packet** privileged EXEC command on the Level 1 router to verify that it sees and forwards packets from the ES.
	Step 4	If necessary, statically configure the router to recognize the ES by using the **clns es-neighbor** interface configuration command.

Possible Problem	Solution	
Router between hosts is down	**Step 1**	Use the **trace** EXEC command to check connectivity between routers and the source ES.
	Step 2	If the **trace** fails at a router, use the **show clns neighbors** EXEC command to see which neighboring routers and ESs are recognized.
	Step 3	If neighboring routers and end systems are up, perform one of the following procedures:
		• For ISO-IGRP, check the routing table and see whether the routes are being learned. Use the **show clns route** EXEC command to display the routing tables.
		• For IS-IS[4], check the LSP[5] database to see whether the links are being reported in link state advertisements. Check the IS-IS routing table to see whether the routes are being installed in the routing table. Use the **show isis database detail** EXEC command to display the routing tables.
Route redistribution problem	Misconfigured route redistribution can cause connectivity problems. For specific troubleshooting information, see the section "Redistribution Causes Routing Problems" later in this chapter.	

1. ES=end system
2. IS=intermediate system
3. ES-IS=End System-to-Intermediate System
4. IS-IS=Intermediate System-to-Intermediate System
5. LSP=Link State Protocol
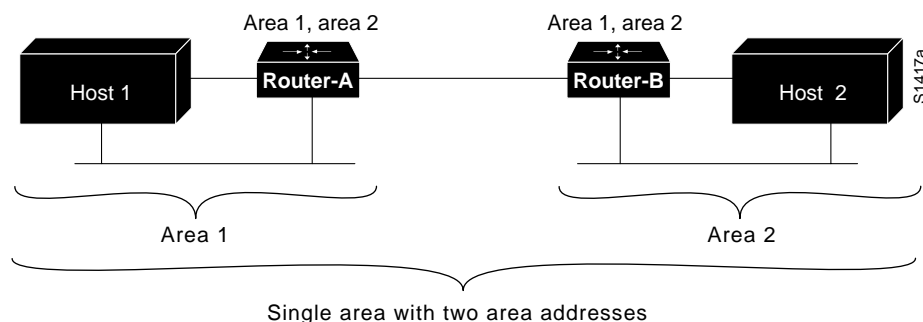
Host Cannot Access Hosts in Same Area

Symptom: Hosts cannot access other hosts in the same area. The hosts might be on the same network or they might be in different network in the same area.

Table 10-2 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 10-2   ISO CLNS: Host Cannot Access Hosts in Same Area

Possible Problem	Solution	
Area address is configured incorrectly on the host	Step 1	Check all Level 1 routing tables and link-state databases.
	Step 2	Verify that the hosts are in the same area.
	Step 3	Check that the NSAP address is entered correctly on the hosts.
Different area addresses are merged into a single area, but the router is configured incorrectly	Step 1	Use the **show running-config** privileged EXEC command to see router configurations. Check whether there are multiple area addresses configured.
	Step 2	If multiple network addresses are configured, verify that the router is configured to support a multihomed area (a single area that has more than one area address).
	Step 3	To communicate, routers must establish a Level 1 adjacency. Therefore, area addresses in a multihomed area must overlap across routers.
		For example, in the multihomed area shown in Figure 10-1, to configure Area 1 and Area 2 as a multihomed area, both Router A and Router B must be configured to be in both areas.
	Step 4	Alternatively, one router can be configured in both areas, while the other router remains configured for a single area. Provided that the area numbers on routers overlap, the routers will establish a Level 1 adjacency, allowing them to communicate.
ES host is not running ES-IS protocol	Step 1	Use the appropriate host commands to verify that an ES-IS process is running. If necessary, initiate the ES-IS process on the host.
	Step 2	Check the adjacency database on the host and verify that it has an entry for its directly connected router.
	Step 3	Use the **debug clns packet** privileged EXEC command on the Level 1 router to verify that it sees and forwards packets from the ES.
	Step 4	If necessary, statically configure the router to recognize the ES by using the **clns es-neighbor** interface configuration command.
Route redistribution problem	Misconfigured route redistribution can cause connectivity problems. For specific troubleshooting information, see the section "Redistribution Causes Routing Problems" later in this chapter.	

Figure 10-1   Multihomed Area Sample Network

Host Cannot Access Hosts in Different Area

Symptom: Host cannot access hosts in a different area. Hosts in the same area are accessible.

Table 10-3 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 10-3   ISO CLNS: Host Cannot Access Hosts in Different Area

Possible Problem	Solution	
Level 2 routers are not routing packets to the correct area	Step 1	Use the **trace** command to verify that Level 1 routers are routing packets to the nearest Level 2 router.
	Step 2	Use the **trace** EXEC command to verify that Level 2 routers are routing packets to the correct destination area.
	Step 3	If packets are not being routed to the correct area, check the Level 2 routing tables (ISO-IGRP) or the Level 2 link state databases (IS-IS) to see whether the packets are being forwarded to another area.
	Step 4	If necessary, reconfigure routers with the correct area addresses and Level 2 (IS-IS) routing information.
ES host is not running ES-IS protocol	Step 1	Use the appropriate host commands to verify that an ES-IS process is running. If necessary, initiate the ES-IS process on the host.
	Step 2	Check the adjacency database on the host and verify that it has an entry for its directly connected router.
	Step 3	Use the **debug clns packet** privileged EXEC command on the Level 1 router to verify that it sees and forwards packets from the ES.
	Step 4	If necessary, statically configure the router to recognize the ES by using the **clns es-neighbor** interface configuration command.
Route redistribution problem	Misconfigured route redistribution can cause connectivity problems. For specific troubleshooting information, see the section "Redistribution Causes Routing Problems" later in this chapter.	
Router between hosts is down	Step 1	Use the **trace** EXEC command to check connectivity between routers and the source ES.
	Step 2	If the **trace** fails at a router, use the **show clns neighbors** EXEC command to see which neighboring routers and ESs are recognized.
	Step 3	If neighboring routers and end systems are up, perform one of the following procedures: • For ISO-IGRP, check the routing table and see whether the routes are being learned. Use the **show clns route** EXEC command to display the routing tables. • For IS-IS, check the LSP database to see whether the links are being reported in link state advertisements. Check the IS-IS routing table to see whether the routes are being installed in the routing table. Use the **show isis database detail** EXEC command to display the routing tables.

Connections Fail Using Certain Protocols

Symptom: Host connections fail using certain protocols. Hosts might be able to connect to other hosts using some protocols but are unable to connect using others.

Table 10-4 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 10-4   ISO CLNS: Connections Fail Using Certain Protocols

Possible Problem	Solution	
Host is not configured to support the service	Verify that the needed protocols are correctly installed and configured on the host system. Consult your vendor's documentation for information on configuring hosts.	
Misconfigured access list	**Step 1**	Use the **trace** EXEC command to determine the path taken to reach remote hosts.
	Step 2	If you discover a router that is stopping traffic, use the **show access-lists** privileged EXEC command to see if any access lists are configured on the router.
	Step 3	Disable all access lists on the router using **no access-group** interface configuration commands on the appropriate interfaces.
	Step 4	Determine whether hosts can now use the protocol in question. If traffic can get through, it is likely that an access list is blocking protocol traffic.
	Step 5	Make sure the access list does not filter traffic from ports that are used by the protocol in question. Configure explicit **permit** statements for traffic that you want the router to forward normally.
	Step 6	Enable the access list and verify that the protocol still functions correctly. If problems persist, continue isolating and analyzing access lists on all routers in the path from source to destination.

Users Cannot Make Connections over Parallel Path

Symptom: In environments with multiple paths between networks, when one link goes down, connections across a parallel link are not possible.

Note IS-IS has equal-cost load balancing for both Level 1 and Level 2 routes. If there are parallel paths in an IS-IS network and one goes down, the other should serve as a backup that is ready to be used immediately.

Table 10-5 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 10-5   **ISO CLNS: Users Cannot Make Connections over Parallel Path**

Possible Problem	Solution	
Routing has not converged	**Step 1**	Use the **show clns route** privileged EXEC command to view the CLNS routing table. Examine the table for routes listed as "possibly down." This indicates that the routing protocol has not converged.
	Step 2	Wait for the routing protocol to converge. Use the **show clns route** command again to see if the routes are now "up."
	Note: ISO-IGRP does load balancing only for domain prefix routes. If you are doing Level 1 or Level 2 routing in ISO-IGRP, only a single path is maintained. If that path goes down, you must wait for the network to converge before the alternative path is available.	
Misconfigured access list	**Step 1**	Use the **trace** EXEC command to determine the path taken to reach remote hosts.
	Step 2	If you discover a router that is stopping traffic, use the **show access-lists** privileged EXEC command to see if any access lists are configured on the router.
	Step 3	Disable all access lists on the router using **no access-group** interface configuration commands on the appropriate interfaces.
	Step 4	Determine whether hosts can now use the protocol in question. If traffic can get through, it is likely that an access list is blocking protocol traffic.
	Step 5	Make sure the access list does not filter traffic from ports that are used by the protocol in question. Configure explicit **permit** statements for traffic that you want the router to forward normally.
	Step 6	Enable the access list and verify that the protocol still functions correctly. If problems persist, continue isolating and analyzing access lists on all routers in the path from source to destination.
Hardware or media problem	For information on troubleshooting hardware problems, see the "Troubleshooting Hardware and Booting Problems" chapter. For information on troubleshooting media problems, see the "Troubleshooting LAN Media Problems" chapter and the "Troubleshooting Serial Line Problems" chapter.	

Redistribution Causes Routing Problems

Symptom: Route redistribution does not work properly and causes routing problems. Traffic does not get through a router that is redistributing routes between two different routing areas or domains—typically IS-IS and ISO-IGRP. Observed symptoms range from poor performance to no communication at all.

Table 10-6 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 10-6   ISO CLNS: Redistribution Causes Routing Problems

Possible Problem	Solution	
Misordered sequence numbers	The sequence numbers used in **route-map** router configuration commands determine the order in which conditions are tested. Misordered sequence numbers can cause redistribution problems.	
	Step 1	Use the **show running-config** privileged EXEC command to display the router configuration. Look for **route-map** router configuration command entries.
	Step 2	If **route-map** commands are configured, look at the sequence numbers that are assigned. Lower sequence numbers are tested before higher sequence numbers, regardless of the order in which they are listed in the configuration.
	Step 3	If conditions are not being tested in the order you want, you must modify the sequence numbers to change the testing order.
Missing or misconfigured **default-metric** command	**Step 1**	Use the **show running-config** EXEC command to view the router configuration. Look for a **default-metric** router configuration command entry.
	Step 2	If the **default-metric** router configuration command or the **distance** router configuration command is missing, add the appropriate version of the missing command.
	Refer to the Cisco IOS *Network Protocols Configuration Guide, Part 2* and *Network Protocols Command Reference, Part 2*, for information about adjusting ISO CLNS default metrics.	
Missing or misconfigured **distance** command	**Step 1**	Use the **show running-config** EXEC command to view the router configuration. Look for a **distance** router configuration command entry.
	Step 2	If the **distance** command is missing, configure a distance specification on the router.
Redistribution feedback loop exists	Redistribution between an IS-IS cloud and an ISO-IGRP cloud should be performed only at a single point. If it is not, routing information can be advertised back into one of the clouds, causing routing feedback loops.	
	If you must redistribute at another point, use default metrics to perform the redistribution in one direction only.	
	Refer to the Cisco IOS *Network Protocols Configuration Guide, Part 2* and *Network Protocols Command Reference, Part 2*, for information about adjusting ISO CLNS default metrics.	

Poor Performance

Symptom: Users experience poor performance or sudden loss of connections. One or more routers might be receiving duplicate routing updates and might see routers and ESs on multiple interfaces.

Table 10-7 outlines the problems that might cause this symptom and describes solutions to those problems.

Table 10-7 ISO CLNS: Poor Performance

Possible Problem	Solution	
Multiple ISO-IGRP processes are configured on a single interface	**Step 1**	Use the **show clns interface** EXEC command to view the interface configuration. Look for multiple ISO-IGRP processes that are configured on a single interface.
	Step 2	If multiple ISO-IGRP processes are configured on a single interface, different Level 2 updates are being sent out through the same interface.
		Multiple Level 2 updates on the same interface can cause congestion problems, especially if the network is large and links are flapping outside of the damping intervals.
	Step 3	Remove one of the ISO-IGRP processes from the interface configuration using the appropriate **no clns router iso-igrp** interface configuration command.
Bridge or repeater in parallel with router	A bridge or repeater in parallel with a router can cause updates and traffic to be seen from both sides of an interface.	
	Step 1	Use the **show clns is-neighbors detail** and the **show clns neighbors detail** EXEC commands to see through which routers and protocols the router's adjacencies were learned.
		Look for routers that are known to be on a remote network. A router listed in the adjacency table but that is not on a directly connected network indicates a problem.
		You can also look for paths to networks (or areas) on multiple interfaces.
	Step 2	If you determine that there is a parallel bridge or repeater, remove the device or configure filters that block routing updates from being learned from the device.
Route redistribution problem	Misconfigured route redistribution can cause performance problems. For specific troubleshooting information, see the section "Redistribution Causes Routing Problems" earlier in this chapter.	