

24. Troubleshooting Routing

HOST CONFIGURATION PROBLEMS

You could have incorrect configurations on the host (or ones that don't match the router).

SETTING	SYMPTOMS
DNS Server	Host can't resolve names. Pings to addresses work; Pings to names don't. If the wrong DNS address came from DHCP, look at the DHCP default-router command on the router (DHCP server).
Default Router	Host can't get off the LAN. Make sure it matches the default router's interface address.
Subnet Mask	Host is confused about when to use default gateway's L2 address and when to directly use the destination's L2 address. If the router's mask is narrower, it won't route to any host outside that narrower subnet. <code>R# show ip route connected</code> <i>Also shows the "L" route with the actual interface address.</i>
Address	Make sure it's in the network

You could also have networking problems

- IP connectivity or routing problem to the DNS server. This is really just the same problem with new participants—welcome to recursive problem solving.
For the router to use DNS, you'll need to configure a DNS server on that router
`R(config)# ip name-server <ip> [<ip> ...]`
`R(config)# ip domain-lookup`
- If DHCP relaying isn't working
 - Check the "ip helper-address" on the interface—DHCP will fail completely if wrong
 - Check networking between the gateway interface and the central DHCP server. This is a good use of the extended ping, changing the source of your ping to the IP address of the interface that does the relaying.

LAN PROBLEMS

If the host can't reach its own default gateway, you have a problem in one of two areas

- The router interface to the LAN—check that it's up/up. Problems could include speed, cabling, err-disabled at the switch, or admin down at the router or switch
- The Ethernet LAN, itself—L2 or L1, port security, etc.

ROUTING PROBLEMS

Routers send packets to the most specific match (longest mask). In the extreme, the default route (0.0.0.0 /0) matches anything as a last resort. Causes for multiple matches:

- Route Summarization—Manual and Autosummarization
- Static Routes
- Subnetting mistakes that create overlapping subnets

R# **show ip route** <address>
Shows what decision the router would make

S H O W I P R O U T E

Table 24-3 on page 578 examines the details of a "show ip route" output.

```
R1# show ip route
Codes: 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

Gateway of last resort is not set

  10.0.0.0/8 is variably subnetted, 5 subnets, 3 masks
    10.0.0.0/8 is the classful network
    5 subnets are the number of known routes, including /32 local interfaces
    3 distinct masks are in use ( /24, /30, and /32 )
C       10.12.0.0/30 is directly connected, Serial0/0
C       10.13.0.0/24 is directly connected, FastEthernet0/0
O IA    10.5.0.1/32 [110/4] via 10.13.0.3, 00:00:03, FastEthernet0/0
O IA    10.25.0.0/24 [110/3] via 10.13.0.3, 01:00:25, FastEthernet0/0
O       10.23.0.0/24 [110/2] via 10.13.0.3, 01:00:25, FastEthernet0/0

O is the source of this route (OSPF)
10.23.0.0 is the subnet for this route
/24 is the mask for this route
110 is the administrative distance for this route (110 is the default for OSPF)
2 is the metric
via 10.13.0.3 is the next hop
1:00:25 is the time since the route was first learned
FastEthernet 0/0 is the exit interface leading to 10.13.0.3
```

O V E R L A P P I N G S U B N E T S

If you're not using VLSM, any overlapping subnets will actually be perfect duplicates (same subnet ID and mask). Just use the mask to calculate the subnet ID that each address is in to find which subnet is used in more than one place.

With VLSM, it's just harder to spot because you're looking for partial overlaps. Calculate the address range for each subnet. Also watch for things like subnet IDs and broadcast addresses being assigned to interfaces and hosts.

If the overlap occurs on two separate routers, IOS can't prevent it. Also, if an interface is shut down, IOS won't check until the interface is activated. [Even though the author doesn't mention it, IOS *will* allow two interface addresses from the same subnet as long as they're on a serial port.]