

# Configure DNS on Routers

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## Introduction

This document describes how to configure Domain Name System (DNS) for Cisco routers.

## Prerequisites

### Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco IOS® Command Line Interface (CLI)
- General DNS behavior

### Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

### Conventions

For more information on document conventions, refer to the [Cisco Technical Tips Conventions](#).

## Set Up a Router to Use DNS Lookups

Your router can be configured to use DNS lookups if you wish to use the `ping` or `traceroute` commands with a host name rather than an IP address. Use these commands to do so:

Command	Description
<code>ip domain lookup</code>	Enables DNS-based host name-to-address translation. This command is enabled by default.



```
!--- Configures the IP address of the name server.
!--- Domain lookup is enabled by default.
!
!
interface GigabitEthernet1
ip address 192.168.1.10 255.255.255.0
negotiation auto
no mop enabled
no mop sysid
!
!
!--- Output Suppressed.

end
```

```
<#root>
```

```
Router#
```

```
ping www.cisco.com
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 10.37.145.84, timeout is 2 seconds:
```

```
!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

```
Router#
```

## Troubleshoot

Under rare conditions, you can see one of these error conditions:

```
<#root>
```

```
Router#
```

```
debug ip udp
```

```
UDP packet debugging is on
```

```
Router#
```

```
ping www.cisco.com
```

```
*Mar  8 06:26:41.732: UDP: sent src=10.69.16.66(5476), dst=
```

```
10.250.35.250(53)
```

```
, length=59
```

```
*Mar  8 06:26:44.740: UDP: sent src=10.69.16.66(5476), dst=10.250.35.250(53), length=59
```

```
*Mar  8 06:26:47.744: UDP: sent src=10.69.16.66(5476), dst=10.250.35.250(53), length=59
```

```
% Unrecognized host or address, or protocol not running.
```

```
Router#undebug all
All possible debugging has been turned off

Router#

ping www.cisco.com

Translating "www.cisco.com"...domain server (172.16.249.4) ;|
Not process
```

```
Router#

ping www.cisco.com

*May 12 16:48:36.302: Reserved port 43478 in Transport Port Agent for UDP IP type 1
*May 12 16:48:36.302: UDP: sent src=0.0.0.0(43478), dst=
255.255.255.255(53)
, length=50
*May 12 16:48:37.303: Reserved port 56191 in Transport Port Agent for UDP IP type 1
*May 12 16:48:37.303: UDP: sent src=0.0.0.0(56191), dst=255.255.255.255(53), length=50
*May 12 16:48:37.304: Released port 43478 in Transport Port Agent for IP type 1
*May 12 16:48:37.304: Released port 43478 in Transport Port Agent for IP type 1%

Unrecognized host or address, or protocol not running.
```

Complete these steps to troubleshoot this problem:

1. Ensure the router can reach the DNS server. Ping the DNS server from the router with its IP address, and make sure that the **ip name-server** command is used to configure the IP address of the DNS server on the router.
2. Use these steps to ensure that the router forwards the lookup requests:
  - a. Define an access control list (ACL) that matches on DNS packets:

```
<#root>

access-list 101 permit udp any any eq domain
access-list 101 permit udp any eq domain any
```

- b. Use the **debug ip packet 101** command.

---

**Caution:** Ensure that you specify the ACL. If you enable the **debug ip packet** command without an ACL it can produce a large amount of output to the console and affect the access to the device.

---

3. Ensure you have the **ip domain-lookup** command enabled on the router.

# You Can Ping a Web Server, But You Cannot View the HTML Pages

In rare cases, you can be unable to access particular Web sites by name. This problem typically results from the inaccessible sites that perform a reverse DNS lookup on the source IP address to verify that the address is not spoofed. If an incorrect entry or no entry returns (in other words, there is no associated name for the IP range) then the HTTP request can be blocked.

When you obtain your Internet domain name, you also must apply for an inaddr.arpa domain. This special domain is sometimes called a reverse domain. The reverse domain maps numeric IP addresses into domain names. If your ISP provides your name server or your ISP assigned you an address from a block of its own addresses, you can not need to apply for an in-addr.arpa domain on your own. Check with your ISP.

Here is an example that uses `www.cisco.com`. This next output was captured from a UNIX workstation. The `nslookup` program and the `dig` program are used. Note the differences in the output:

```
<#root>
```

```
sj-cse-280%
```

```
nslookup www.cisco.com
```

```
Note: nslookup is deprecated and can be removed from future releases.  
Consider with the 'dig' or 'host' programs instead. Run nslookup with  
the '-sil[ent]' option to prevent this message from appearing.
```

```
Server:          172.16.226.120  
Address:         172.16.226.120#53  
Name:   www.cisco.com  
Address: 192.168.219.25
```

```
sj-cse-280%
```

```
nslookup 192.168.219.25
```

```
Note: nslookup is deprecated and can be removed from future releases.  
Consider with the 'dig' or 'host' programs instead. Run nslookup with  
the '-sil[ent]' option to prevent this message from appearing.
```

```
Server:          172.16.226.120  
Address:         172.16.226.120#53  
10.219.133.198.in-addr.arpa      name = www.cisco.com.
```

The `dig` program prints more detailed information from the DNS packets:

```
<#root>
```

```
sj-cse-280%
```

```
dig 192.168.219.25
```

```
; <<>> DiG 9.0.1 <<>> 192.168.219.25  
;; global options: printcmd  
;; Got answer:
```

```

;; ->>HEADER<<- opcode: QUERY, status: NXDOMAIN, id: 5231
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 0

;; QUESTION SECTION:
;192.168.219.25.                IN      A

;; AUTHORITY SECTION:
.                86400   IN      SOA
A.ROOT-SERVERS.NET. nstld.verisign-grs.com.
( 2002031800 1800 900 604800 86400 )

;; Query time: 135 msec
;; SERVER: 172.16.226.120#53(172.16.226.120)
;; WHEN: Mon Mar 18 09:42:20 2002
;; MSG SIZE rcvd: 107

```

## Router Queries Multiple Name Servers

Dependant upon on the network activity level, the router can query multiple name servers listed in the configuration. This is an example from the output **debug ip domain detail**:

```

<#root>

Router#

show run | section name-server

ip name-server 192.168.1.1 10.0.0.2
Router#
Router#

debug ip domain detail

Router#

test002

*May 12 17:56:32.723: DNS: detail: cdns_name_verify_internal: Checking if hostname is valid or not
*May 12 17:56:32.723: DNS: info: cdns_name_verify_internal: Hostname is valid
*May 12 17:56:32.723: DNS: detail: cdns_get_rr_type: converting name kind 2000 to type 28
*May 12 17:56:32.723: DNS: detail: read_forwards: Forward zone server list:
*May 12 17:56:32.723: DNS: info: delegpt_log: DelegationPoint<.>: 0 names (0 missing), 2 addrs (0
*May 12 17:56:32.724: DNS: detail: val_operate: validator[module 0] operate: extstate:module_state
*May 12 17:56:32.724: DNS: info: log_nametypeclass: validator operate: query test002. AAAA IN
*May 12 17:56:32.724: DNS: detail: iter_operate: iterator[module 1] operate: extstate:module_state
*May 12 17:56:32.724: DNS: info: log_nametypeclass: resolving test002. AAAA IN
*May 12 17:56:32.724: DNS: detail: error_response: return error response NXDOMAIN
*May 12 17:56:32.724: DNS: detail: val_operate: validator[module 0] operate: extstate:module_wait
*May 12 17:56:32.724: DNS: info: log_nametypeclass: validator operate: query test002. AAAA IN
*May 12 17:56:32.725: DNS: detail: cdns_get_rr_type: converting name kind 2000 to type 28
*May 12 17:56:32.725: DNS: detail: read_forwards: Forward zone server list:
*May 12 17:56:32.725: DNS: info: delegpt_log: DelegationPoint<.>: 0 names (0 missing), 2 addrs (0
*May 12 17:56:32.726: DNS: detail: val_operate: validator[module 0] operate: extstate:module_state
*May 12 17:56:32.726: DNS: info: log_nametypeclass: validator operate: query test002. AAAA IN
*May 12 17:56:32.726: DNS: detail: iter_operate: iterator[module 1] operate: extstate:module_state

```

```

*May 12 17:56:32.726: DNS: info: log_nameypeclass: resolving test002. AAAA IN
*May 12 17:56:32.726: DNS: info: log_nameypeclass: processQueryTargets: test002. AAAA IN
*May 12 17:56:32.726: DNS: info: log_nameypeclass: sending query: test002. AAAA IN
*May 12 17:56:32.726: DNS: detail: log_name_addr: sending to target: <.> 192.168.1.1#53
*May 12 17:56:32.726: DNS: detail: cdns_get_first_hop: dst 192.168.1.1, intf GigabitEthernet1

*May 12 17:56:32.726: DNS: detail: cdns_set_udp_source_interface: using source interface GigabitEt
*May 12 17:56:33.726: DNS: detail: cdns_get_first_hop: dst 192.168.1.1, intf GigabitEthernet1
*May 12 17:56:33.726: DNS: detail: cdns_set_udp_source_interface: using source interface GigabitEt
*May 12 17:56:34.726: DNS: detail: iter_operate: iterator[module 1] operate: extstate:module_wait_
*May 12 17:56:34.726: DNS: info: log_nameypeclass: iterator operate: query test002. AAAA IN
*May 12 17:56:34.726: DNS: info: log_nameypeclass: processQueryTargets: test002. AAAA IN
*May 12 17:56:34.727: DNS: info: log_nameypeclass: sending query: test002. AAAA IN
*May 12 17:56:34.727: DNS: detail: log_name_addr: sending to target: <.> 192.168.1.1#53
*May 12 17:56:34.727: DNS: detail: cdns_get_first_hop: dst 192.168.1.1, intf GigabitEthernet1
*May 12 17:56:34.727: DNS: detail: cdns_set_udp_source_interface: using source interface GigabitEt
*May 12 17:56:35.729: DNS: detail: iter_operate: iterator[module 1] operate: extstate:module_wait_
*May 12 17:56:35.729: DNS: info: log_nameypeclass: iterator operate: query test002. AAAA IN
*May 12 17:56:35.729: DNS: info: log_nameypeclass: response for test002. AAAA IN

*May 12 17:56:35.729: DNS: info: log_name_addr: reply from <.> 192.168.1.1#53
*May 12 17:56:35.729: DNS: info: processQueryResponse: query response was THROWAWAY

*May 12 17:56:35.729: DNS: info: log_nameypeclass: processQueryTargets: test002. AAAA IN

*May 12 17:56:35.729: DNS: info: log_nameypeclass: sending query: test002. AAAA IN
*May 12 17:56:35.729: DNS: detail: log_name_addr: sending to target: <.> 10.0.0.2#53
*May 12 17:56:35.730: DNS: detail: cdns_get_first_hop: dst 10.0.0.2, intf GigabitEthernet1

*May 12 17:56:35.730: DNS: detail: cdns_set_udp_source_interface: using source interface GigabitEt
*May 12 17:58:35.732: DNS: error: comm_point_tcp_handle_write: tcp connect: Connection refused
*May 12 17:58:35.732: DNS: detail: log_addr: remote address is ip4 10.0.0.2 port 53 (len 16)
*May 12 17:58:35.732: DNS: detail: outnet_tcp_cb: outnettcp got tcp error -1
*May 12 17:58:35.732: DNS: detail: log_addr: tcp error for address ip4 10.0.0.2 port 53 (len 16)
*May 12 17:58:35.732: DNS: detail: iter_operate: iterator[module 1] operate: extstate:module_wait_
*May 12 17:58:35.732: DNS: info: log_nameypeclass: iterator operate: query test002. AAAA IN
*May 12 17:58:35.732: DNS: info: log_nameypeclass: processQueryTargets: test002. AAAA IN

```

This behavior is expected and occurs when the router needs to create an Address Resolution Protocol (ARP) entry for the DNS server. By default, a router maintains an ARP entry for four hours. In periods of low activity, the router needs to complete the ARP entry and then perform the DNS query. If the ARP entry for the DNS server is not in the router ARP table, then you would get a failure if it sends only one DNS query. So, two queries are sent out, one to get the ARP entry, if needed, and the second to actually do the DNS query. This behavior is common with TCP/IP applications.

## Related Information

- [IP Addressing Support](#)
- [IP Routing Support](#)
- [Cisco Technical Support & Downloads](#)