

Configuring WINS, DNS and DHCP on Access Servers

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Introduction

Certain dialin clients require Windows Internet Naming Service (WINS), and/or Domain Naming System (DNS) server information in order to properly connect to the network. There are also several different mechanisms for delivering IP addresses to dialin clients on access servers.

Prerequisites

Requirements

Ensure that you meet these requirements before you attempt this configuration:

- Configure and verify that the router can accept incoming async and ISDN calls. Use the configuration procedure specified in *Configuring an Access Server with PRIs for Incoming Multilink Async and ISDN Calls* for further information.
- Verify that the DHCP, DNS and WINS servers are setup correctly. Contact your system administrator for more information.

Note: This configuration assumes the WINS, DNS, and DHCP servers are different servers. They can in fact be one server, or one server can be running WINS and DNS with DHCP on another box or any other combination of the three.

Components Used

This configuration was developed and tested using this equipment/devices:

- Cisco AS5200 with two T1 PRI circuits
- DNS server

- WINS server
- DHCP server to assign IP addresses to the client

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, make sure that you understand the potential impact of any command.

Related Products

This DNS, DHCP and WINS configuration commands can be used on any router that supports incoming PPP calls.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Background Theory

Some possible options for assigning IP addresses to clients include:

- Assigning an address from the local IP pool on the access server.
- Using an external Dynamic Host Control Protocol (DHCP) server.
- Using Remote Authentication Dial-in User Service (RADIUS) or Terminal Access Controller Access Control System (TACACS+).

This document describes the procedure to pass WINS and DNS server information to the dialin client through the access server. The access server will also pass the IP address returned by an external DHCP server to the dialin client.

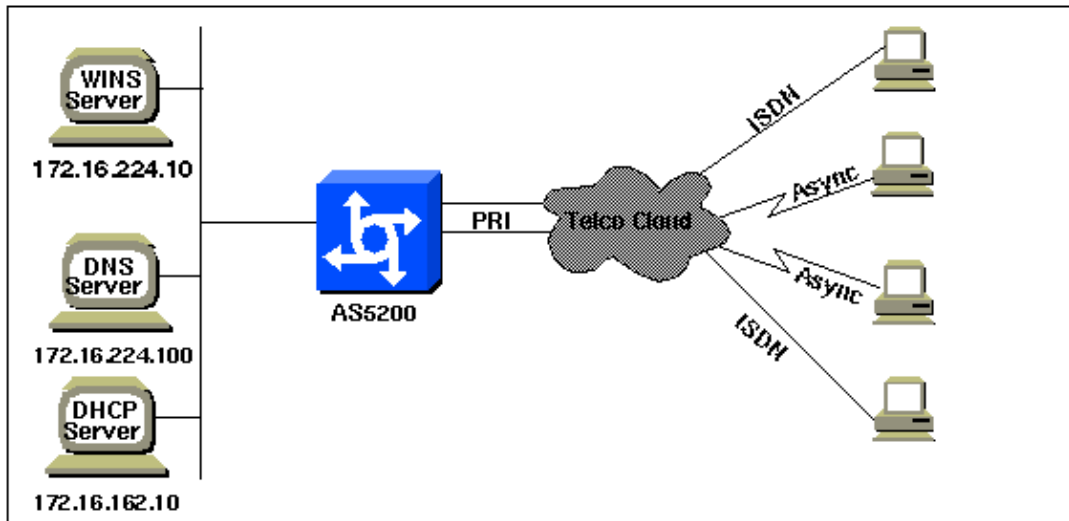
For more information, refer to the documents in the Related Information section of this document

Configure

In this section, you are presented with the information to configure the features described in this document.

Network Diagram

This document uses the network setup shown in this diagram:



Configurations

This AS5200 Access Server is configured with two Primary Rate Interfaces (PRIs) to allow incoming async and ISDN users. Dynamic dialer maps are created for ISDN users. Without TACACS+ or RADIUS configured, a username and password must be configured for each user requiring dial in access. All IP addresses are handed to the client by the DHCP server. The access server passes the IP address of the DNS and WINS servers to the client during PPP IP Control Protocol (IPCP) negotiation.

```

AS5200 Access Server
version 11.1
!
service timestamps debug datetime msec localtime show-timezone
service timestamps log datetime msec localtime show-timezone
no service udp-small-servers
no service tcp-small-servers
!
hostname as5200
!
enable password letmein
!
username Jason password foo
username Laura password bar
username Russ password fake
username Syed password pseudo
username Tito password knockknock
!
controller T1 0
 framing esf
 clock source line primary
 linecode b8zs
 pri-group timeslots 1-24
!
controller T1 1
 framing esf
 clock source line secondary
 linecode b8zs
 pri-group timeslots 1-24
!
interface Loopback0
 ip address 172.16.209.65 255.255.255.192
!
interface Loopback1
 ip address 172.16.209.129 255.255.255.192

```

```
!  
interface Ethernet0  
 ip address 172.16.162.4 255.255.255.0  
  
!  
interface Serial0  
 no ip address  
!  
interface Serial1  
 no ip address  
!  
interface Serial0:23  
 no ip address  
 isdn incoming-voice modem  
 dialer rotary-group 1  
 encapsulation ppp  
 no fair-queue  
!  
interface Serial1:23  
 no ip address  
 encapsulation ppp  
 dialer rotary-group 1  
 isdn incoming-voice modem  
 no fair-queue  
!  
interface Group-Async1  
 ip unnumbered Ethernet0  
 encapsulation ppp  
 async mode interactive  
 peer default ip address dhcp  
  
! -- Async dialup users will be assigned ip addresses from  
! -- the dhcp server. The dhcp server is specified with the  
! -- ip dhcp-server command shown below.  
! -- Refer to the section Command Summary for more information.  
  
 ip helper-address 172.16.162.10  
  
! -- The ip helper address command enables BOOTP broadcast  
! -- forwarding for a set of clients. The helper address specifies  
! -- the address of the DHCP server configured below.  
! -- Refer to the section Command Summary for more information.  
  
 ppp authentication chap  
 group-range 1 48  
!  
interface Dialer1  
 ip unnumbered Ethernet0  
 encapsulation ppp  
 peer default ip address dhcp  
  
! -- ISDN dialup users will be assigned ip addresses from the dhcp server.  
! -- The dhcp server specified with the ip dhcp-server command shown  
! -- below. Refer to the section Command Summary for more information.  
  
 ip helper-address 172.16.162.10  
  
! -- The ip helper address command enables BOOTP broadcast  
! -- forwarding for a set of clients. The helper address specifies  
! -- the address of the DHCP server configured below.  
! -- Refer to the section Command Summary for more information.  
  
 dialer in-band  
 dialer idle-timeout 300  
 dialer-group 1  
 no fair-queue
```

```

ppp multilink
ppp authentication chap
!
router eigrp 222
 redistribute connected
 network 172.16.0.0
!
dialer-list 1 protocol ip permit
!
async-bootp dns-server 172.16.224.100 172.16.154.101

! -- Specifies the primary and secondary DNS servers.
! -- The first IP address belongs to the primary DNS server.
! -- If you only have one DNS server you do not need to specify
! -- a secondary DNS server.
! -- Refer to the section Command Summary for more information.

async-bootp nbns-server 172.16.224.10 172.16.4.2

! -- Specifies the primary and secondary WINS servers.
! -- The first IP address belongs to the primary WINS server.
! -- If you only have one WINS server you do not need to specify
! -- a secondary WINS server.
! -- Refer to the section Command Summary for more information.

ip dhcp-server 172.16.162.10

! -- Specifies the dhcp server ip address. This command is required
! -- if the IP address for dialin clients is obtained from the server.
! -- Note: The dhcp server need not be on the same subnet as the
! -- Ethernet interface.
! -- It can be more than one hop away as long as it is reachable.

!
line con 0
 login
line 1 48
modem InOut
transport input telnet
 autoselect during-login
 autoselect ppp
 flowcontrol hardware
line aux 0
line vty 0 4
 password secret
 login
!
end

```

Command Summary

This is a description of the relevant commands for DHCP, DNS and WINS on Access Servers:

- **ip helper-address *address*** DHCP protocol information is carried inside of BOOTP packets. The ip helper address command enables BOOTP broadcast forwarding for a set of clients. The helper address should specify the address of the DHCP server and should be configured on the interface closest to the client (in this case the group-async and dialer interfaces). If you have multiple servers, you can configure one helper address for each server. Helper addresses are defined in RFC 1531 . You cannot configure multiple domain names in the DHCP pool.
- **peer default ip address dhcp** Specifies an address from the DHCP mechanism to be returned to a remote peer connecting to this interface. This means that clients connecting on that interface will be assign an IP address retrieved from the DHCP server. You should also specify the IP address of the

DHCP server, using the command **ip dhcp server**, from which the client IP address will be obtained.

- **async-bootp dns-server address** Configures the address of the DNS server with which the NAS responds when dealing with PPP clients that implement RFC1877 . The DNS server IP address will be passed to the dialin client during IPCP negotiation.
- **async-bootp nbns-server address** Specifies the IP address of the Windows Name Service (WINS) server. The WINS server IP address will be passed to the dialin client during IPCP negotiation.

Verify

To verify whether the client has correctly received the appropriate parameters from the Access Server, you need to test from the client.

For example, from the client, ping a DNS resolvable address such as `www.cisco.com`. If the DNS server resolves the address, then the configuration is working correctly. To test the WINS server assignment, use Windows networking to browse the network.

Use the **show dialer map** command after an ISDN connection is made, to see if a dynamic dialer map was created. Without it, you cannot route. You should see an address assigned to the peer (the address was obtained from the DHCP server). This verifies that the DHCP address assignment was successful.

The Output Interpreter Tool (registered customers only) (OIT) supports certain **show** commands. Use the OIT to view an analysis of **show** command output.

Troubleshoot

This section provides information you can use to troubleshoot your configuration.

Troubleshooting Commands

This document assumes that ISDN Layers 1, 2 and 3 are working correctly. If you have issues with ISDN lower layer issues. Refer to the document Using the **show isdn status** Command for BRI Troubleshooting for more information.

Note: Refer to Important Information on Debug Commands before you use **debug** commands.

- **debug ppp authentication** To see if a client is passing authentication. If you are using a version prior to Cisco IOS® Software Release 11.2, use the `debug ppp chap` command instead.
- **debug ppp negotiation** To see if a client is passing PPP negotiation; this is when you check for address negotiation. The IPCP negotiation shows the DNS and WINS server information being passed to the client
- **debug ppp error** To display protocol errors and error statistics associated with PPP connection negotiation and operation.

The DNS and WINS server assignment can be seen in the IPCP phase of the PPP negotiation. A sample output is provided below.

Sample Debug Output

This **debug ppp negotiation** command output (for an Async Dialin call) shows the IPCP negotiation for the client. In this example, only a primary DNS server was specified. The WINS server is not passed to the client.

```
Sep 26 12:50:47.227: As97 CHAP: O CHALLENGE id 1 len 32  
from "maui-nas-02"
```

```
Sep 26 12:50:47.355: As97 CHAP: I RESPONSE id 1 len 31
from "async_user"
Sep 26 12:50:47.355: As97 AUTH: Started process 0 pid 56
Sep 26 12:50:47.355: As97 CHAP: O SUCCESS id 1 len 4
Sep 26 12:50:47.359: As97 PPP: Phase is UP [0 sess, 0 load]
```

! -- IPCP negotiation begins

```
Sep 26 12:50:47.359: As97 IPCP: O CONFREQ [Closed] id 1 len 10
Sep 26 12:50:47.359: As97 IPCP:   Address 172.22.53.140
(0x0306AC16358C)
Sep 26 12:50:47.467: As97 IPCP: I CONFREQ [REQsent] id 1 len 40
Sep 26 12:50:47.467: As97 IPCP:   CompressType VJ 15 slots
CompressSlotID
(0x0206002D0F01)
Sep 26 12:50:47.467: As97 IPCP:   Address 0.0.0.0
(0x030600000000)
Sep 26 12:50:47.467: As97 IPCP:   PrimaryDNS 172.22.53.210
(0x8106AC1635D2)
Sep 26 12:50:47.467: As97 IPCP:   PrimaryWINS 0.0.0.0
(0x820600000000)
Sep 26 12:50:47.467: As97 IPCP:   SecondaryDNS 0.0.0.0
(0x830600000000)
Sep 26 12:50:47.467: As97 IPCP:   SecondaryWINS 0.0.0.0
(0x840600000000)
Sep 26 12:50:47.467: As97 AAA/AUTHOR/IPCP: Start.
Her address 0.0.0.0, we want 172.22.60.2
Sep 26 12:50:47.467: As97 AAA/AUTHOR/IPCP: Done.
Her address 0.0.0.0, we want 172.22.60.2
```

! -- The IP address for the client is assigned.

```
Sep 26 12:50:47.467: As97 IPCP: O CONFREQ [REQsent] id 1 len 28
Sep 26 12:50:47.467: As97 IPCP:   CompressType VJ 15 slots
CompressSlotID
(0x0206002D0F01)
Sep 26 12:50:47.467: As97 IPCP:   PrimaryWINS 0.0.0.0
(0x820600000000)
Sep 26 12:50:47.467: As97 IPCP:   SecondaryDNS 0.0.0.0
(0x830600000000)
Sep 26 12:50:47.467: As97 IPCP:   SecondaryWINS 0.0.0.0
(0x840600000000)
Sep 26 12:50:47.483: As97 CCP: I CONFREQ [Not negotiated]
id 1 len 15
Sep 26 12:50:47.483: As97 CCP:   MS-PPC supported bits
0x00000001
(0x120600000001)
Sep 26 12:50:47.483: As97 CCP:   Stacker history 1 check mode
EXTENDED
(0x1105000104)
Sep 26 12:50:47.483: As97 LCP: O PROTREQ [Open] id 4 len 21
protocol CCP
Sep 26 12:50:47.483: As97 LCP: (0x80FD0101000F12060000000111050001)
Sep 26 12:50:47.483: As97 LCP: (0x04)
Sep 26 12:50:47.499: As97 IPCP: I CONFACK [REQsent] id 1 len 10
Sep 26 12:50:47.499: As97 IPCP:   Address 172.22.53.140
(0x0306AC16358C)
Sep 26 12:50:49.359: As97 IPCP: TIMEOUT: State ACKrcvd
Sep 26 12:50:49.359: As97 IPCP: O CONFREQ [ACKrcvd] id 2 len 10
Sep 26 12:50:49.359: As97 IPCP:   Address 172.22.53.140
(0x0306AC16358C)
Sep 26 12:50:49.467: As97 IPCP: I CONFACK [REQsent] id 2 len 10
Sep 26 12:50:49.467: As97 IPCP:   Address 172.22.53.140
(0x0306AC16358C)
Sep 26 12:50:50.459: As97 IPCP: I CONFREQ [ACKrcvd] id 2 len 34
Sep 26 12:50:50.459: As97 IPCP:   Address 0.0.0.0 (0x030600000000)
```

```

Sep 26 12:50:50.459: As97 IPCP: PrimaryDNS 172.22.53.210
(0x8106AC1635D2)
Sep 26 12:50:50.459: As97 IPCP: PrimaryWINS 0.0.0.0
(0x820600000000)
Sep 26 12:50:50.459: As97 IPCP: SecondaryDNS 0.0.0.0
(0x830600000000)
Sep 26 12:50:50.459: As97 IPCP: SecondaryWINS 0.0.0.0
(0x840600000000)
Sep 26 12:50:50.459: As97 AAA/AUTHOR/IPCP: Start.
Her address 0.0.0.0, we want 172.22.60.2
Sep 26 12:50:50.463: As97 AAA/AUTHOR/IPCP: Done.
Her address 0.0.0.0, we want 172.22.60.2
Sep 26 12:50:50.463: As97 IPCP: O CONFREJ [ACKrcvd] id 2 len 22
Sep 26 12:50:50.463: As97 IPCP: PrimaryWINS 0.0.0.0
(0x820600000000)
Sep 26 12:50:50.463: As97 IPCP: SecondaryDNS 0.0.0.0
(0x830600000000)
Sep 26 12:50:50.463: As97 IPCP: SecondaryWINS 0.0.0.0
(0x840600000000)
Sep 26 12:50:50.571: As97 IPCP: I CONFREQ [ACKrcvd] id 3 len 16
Sep 26 12:50:50.571: As97 IPCP: Address 0.0.0.0
(0x030600000000)
Sep 26 12:50:50.571: As97 IPCP: PrimaryDNS 172.22.53.210
(0x8106AC1635D2)
Sep 26 12:50:50.571: As97 AAA/AUTHOR/IPCP: Start.
Her address 0.0.0.0, we want 172.22.60.2
Sep 26 12:50:50.571: As97 AAA/AUTHOR/IPCP: Done.
Her address 0.0.0.0, we want 172.22.60.2
Sep 26 12:50:50.571: As97 IPCP: O CONFNAK [ACKrcvd] id 3 len 10
Sep 26 12:50:50.571: As97 IPCP: Address 172.22.60.2
(0x0306AC163C02)
Sep 26 12:50:50.683: As97 IPCP: I CONFREQ [ACKrcvd] id 4 len 16
Sep 26 12:50:50.683: As97 IPCP: Address 172.22.60.2
(0x0306AC163C02)
Sep 26 12:50:50.683: As97 IPCP: PrimaryDNS 172.22.53.210
(0x8106AC1635D2)
Sep 26 12:50:50.683: As97 AAA/AUTHOR/IPCP: Start.
Her address 172.22.60.2, we want 172.22.60.2
Sep 26 12:50:50.683: As97 AAA/AUTHOR/IPCP: Reject 172.22.60.2,
using 172.22.60.2
Sep 26 12:50:50.687: As97 AAA/AUTHOR/IPCP: Done.
Her address 172.22.60.2, we want 172.22.60.2
Sep 26 12:50:50.687: As97 IPCP: O CONFACK [ACKrcvd] id 4 len 16
Sep 26 12:50:50.687: As97 IPCP: Address 172.22.60.2
(0x0306AC163C02)
Sep 26 12:50:50.687: As97 IPCP: PrimaryDNS 172.22.53.210
(0x8106AC1635D2)

! -- The IP address of the client and Primary DNS server's
! -- IP address are negotiated.

Sep 26 12:50:50.687: As97 IPCP: State is Open

```

Related Information

- [Windows Networking Design Implementation Guide](#)
- [Using the Cisco IOS DHCP Server on Access Servers](#)
- [How to Enable Browsing Using NetBIOS Over IP](#)
- [Connecting a Windows 95 Client to a Windows NT Server through a Cisco Router](#)
- [Configuring an Access Server with PRIs for Incoming Multilink Async and ISDN Calls](#)
- [Advanced TACACS+ for Dialup Clients](#)
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