Configuring Cisco Network Registrar to Provide DHCP Service to Avaya IP Telephones and Avaya™ IP Softphones - Issue 1.0

Abstract

These Application Notes present a sample configuration of the Cisco Network Registrar to provide DHCP service to Avaya IP Telephones and AvayaIP Softphones. The Cisco Network Registrar (CNR) product is a software system that provides Domain Name System and Dynamic Host Configuration Protocol (DNS/DHCP) administrative functionality to help customers automate and streamline IP networking services. Avaya IP Telephones and Avaya IP Softphones can use the Cisco Network Registrar as a resource to get DHCP services.

1. Introduction

Avaya™ IP Telephones are designed as fully featured DHCP clients. They can get IP addresses from the DHCP servers. Avaya™ IP Softphones also work on PCs configured as DHCP clients. The Cisco Network Registrar (CNR) product is a software system that provides Domain Name System and Dynamic Host Configuration Protocol (DNS/DHCP) administrative functionality to help customers automate and streamline IP networking services. Avaya IP Telephones and Avaya IP Softphones can use the Cisco Network Registrar as a resource to get DHCP services.

The network in **Figure 1** was used for verification. There are two IP networks defined here: network 20.1.1.0/24 on the client side and network 10.1.1.0/24 on the server side. But both networks are different.

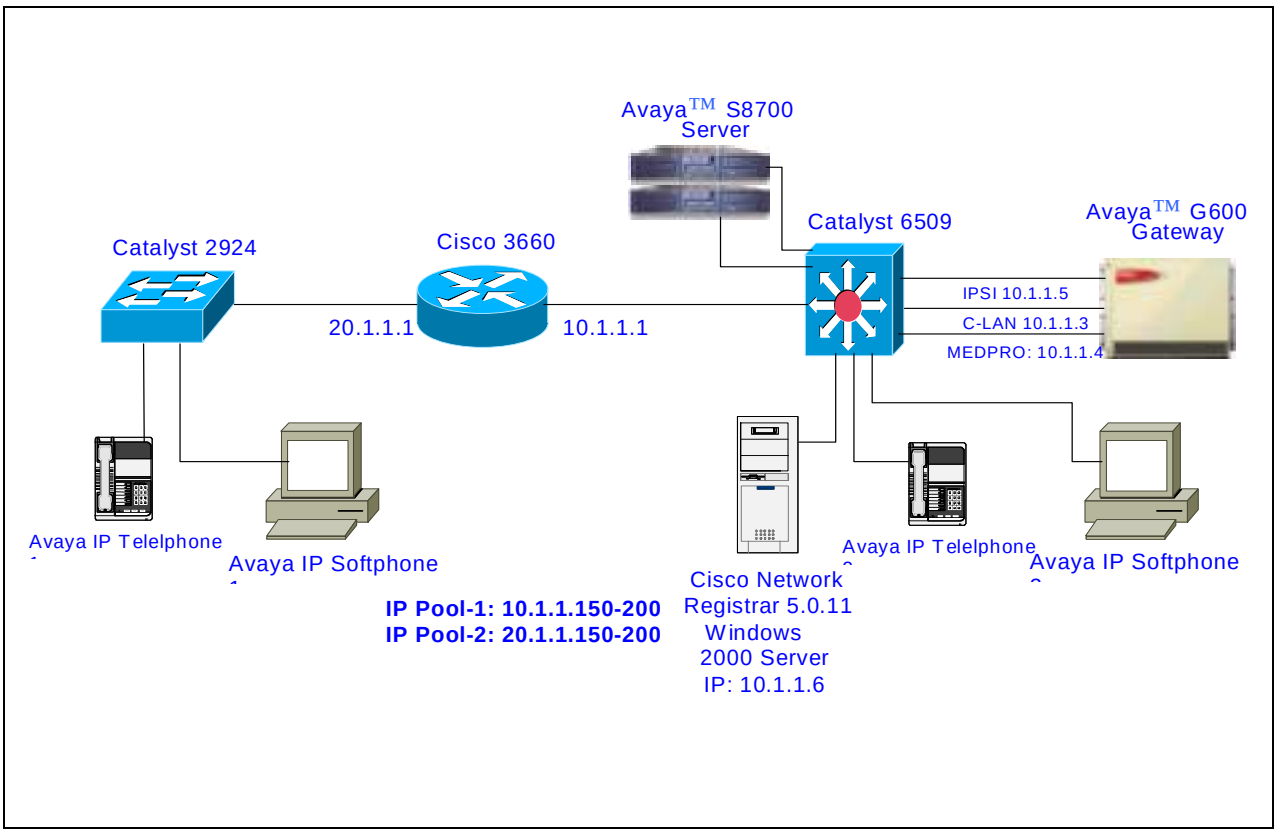

Figure 1. Network Topology

2. Equipment and Software Validated

The following equipment and software were used for the sample configuration:

Equipment	Software
Avaya™ S8700 Media Server	MultiVantage™ 1.1 (R011rl00.1.060.4 with Patch 13)
Avaya IP Telephone	R1.6
Avaya IP Softphone	R 3.2.14.0 on W2K platform
Cisco Network Registrar	Version 5.0.11 loaded on Windows 2000 Server
Cisco 3660 Router	IOS 12.2(1)
Catalyst 6509 Switch	Cat. IOS 6.2(3)
Catalyst 2924 Switch	Cat. IOS 12.0(5.2)XU

3. Configure DHCP Server on the Cisco Network Registrar

To configure the DHCP server, the Cisco Network Registrar needs the following information:

- DHCP server address - Specifies the IP address of the DHCP server.
- One or more *policies* – Specifies, at a minimum, the lease times for the addresses.
- One or more address pools (called *scopes*) – Makes IP addresses available to the DHCP server for client IP address assignment.

Assuming the Cisco Network Registrar has been installed and operational, the following steps outline the procedures of setting up the DHCP server and creating IP scopes, options and other related parameters.

When configuring a DHCP server, it is necessary to configure the server properties, policies, and associated DHCP options.

Note: Whenever the server's properties are changed, the server must be reloaded by selecting **Reload** from server's property menu. This will force the server to reload the configuration data from the Cisco Network Registrar database.

3.1. Selecting the Server Interface

Select the IP address of the server's interface (Ethernet card) as the DHCP server's IP address. This interface must have a static IP address that is not assigned dynamically by DHCP.

Launch **Cisco Network Registrar** from **Start → Programs** from the Window 2000 Server. Double click the DHCP server icon. Open the Server Manager window, and double-click the DHCP server to be configured. This opens the DHCP Server Properties dialog box. The **General** tab should be selected (**Figure 2**).

- Use the default server name supplied by the Cisco Network Registrar in the **name** field, or define a server name.
- Select **Use interface:** and type the IP address and subnet mask into the associated fields.
- Click **OK**.

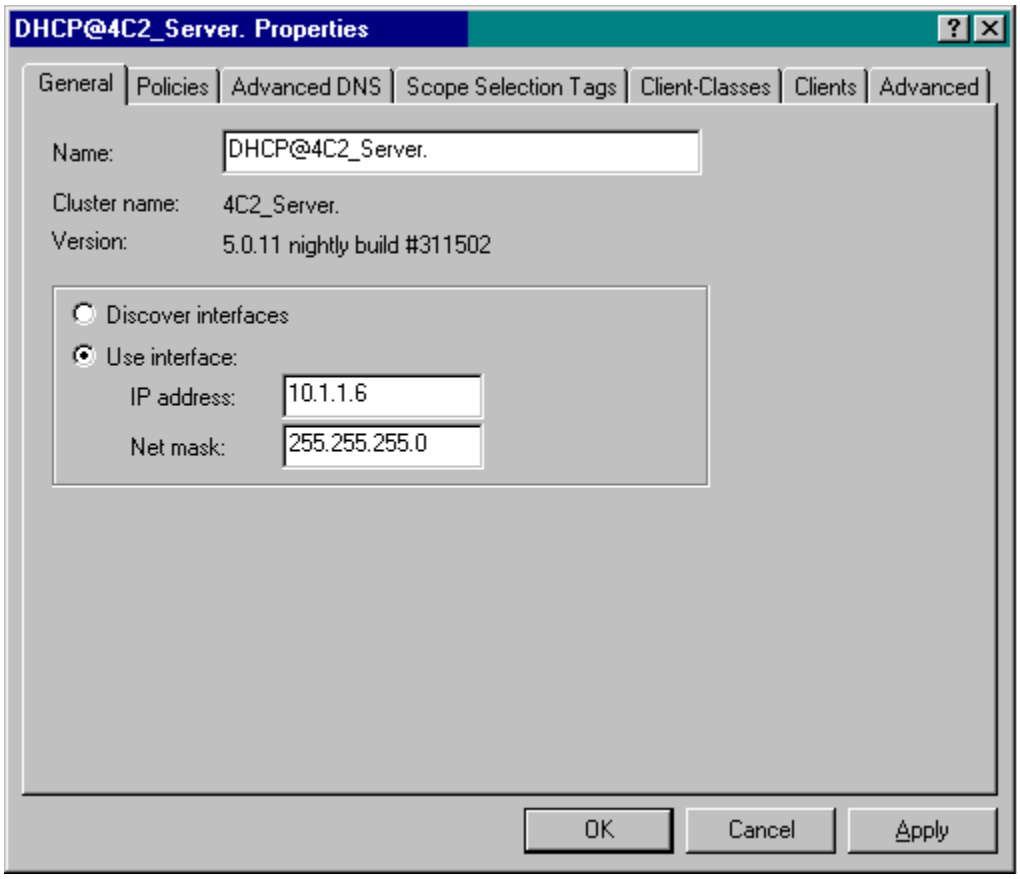

Figure 2. General Tab (DHCP Server Properties Dialog Box)

3.2. Creating Policies

- Click **Policies** tab and select **new** (**Figure 3.**).
- Type policy name **network-10.1.1.0** and click **OK** (**Figure 4**).
- The server has a default 7 day lease time for this policy. Change the lease duration as needed, or check the box **Leases are permanent** to make the leases never expire.

Repeat the same procedure to create the policy for network 20.1.1.0.

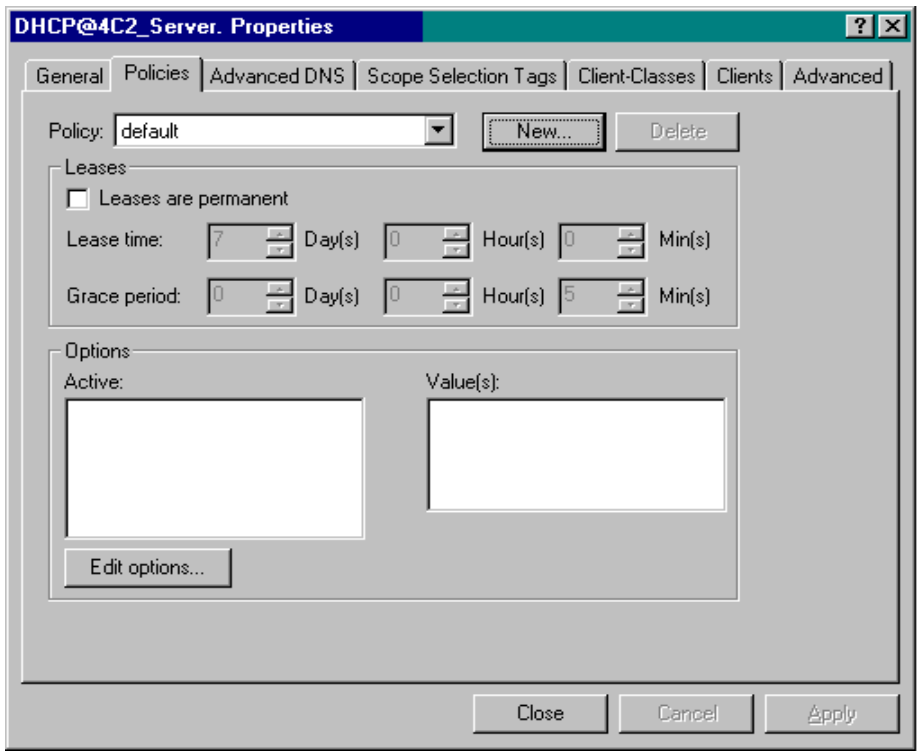

Figure 3. Policy Tab (DHCP Server Properties Dialog Box)

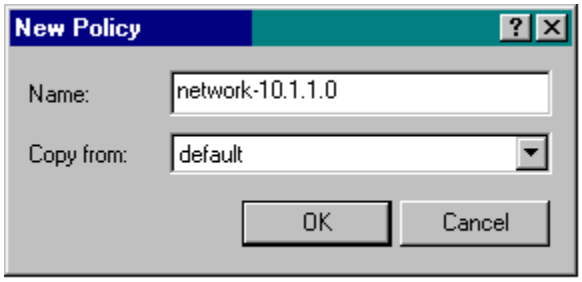

Figure 4. New Policy Dialog Box

3.3. Configuring Custom DHCP Options

Avaya IP Telephones require option 176 to get the configuration file and download an image from a TFTP server. Cisco Network Registrar allows the user to create custom options.

- Select **Advanced** tab and click **Custom Options** (**Figure 5**).
- Click **Add** button.
- In the **Add Custom Option** menu (**Figure 6**), Pick **176** in the **Option Number** field.
- Type **ip-phone-image** in the **Option Name** field.
- Select **string** in the **Option Data Type** field and click **OK**.

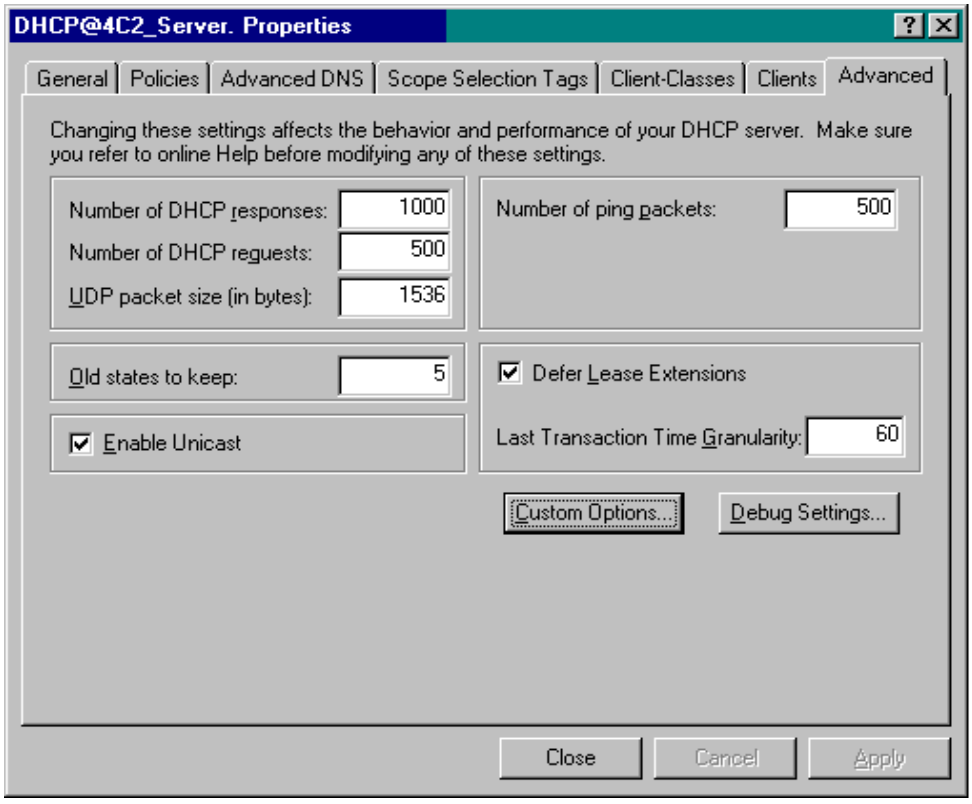

Figure 5. Advanced Tab (DHCP Server Properties Dialog Box)

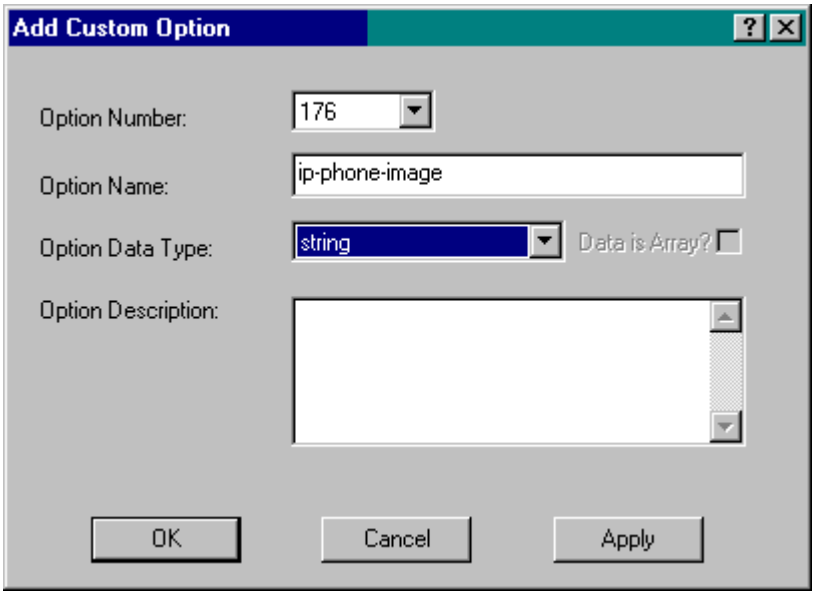

Figure 6. Add Option Tab Dialog Box

3.4. Adding DHCP Options for the Policy

Step 1. Add the router option.

- Click **Policies** tab.
- Select policy **network-10.1.1.0** from the **Policy** field (**Figure 7**).
- Click **Edit options**.
- Expand **Basic** and select **routers** (**Figure 8**).
- Click the **Add** button and highlight **routers** inside the **Active** box.
- Type the router's IP address 10.1.1.1 into the **Option value(s)** field and click **OK**.
- Note that the default lease time is 7 days.

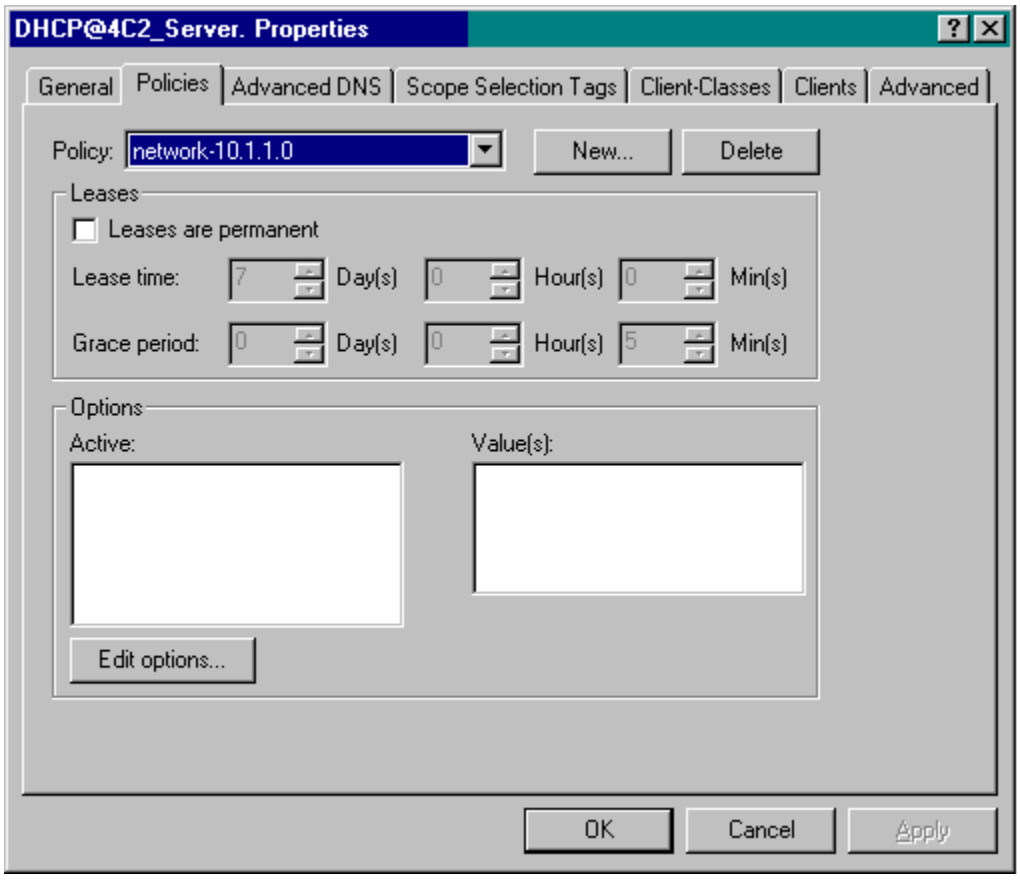

Figure 7. Policy Tab (DHCP Server Properties Dialog Box)

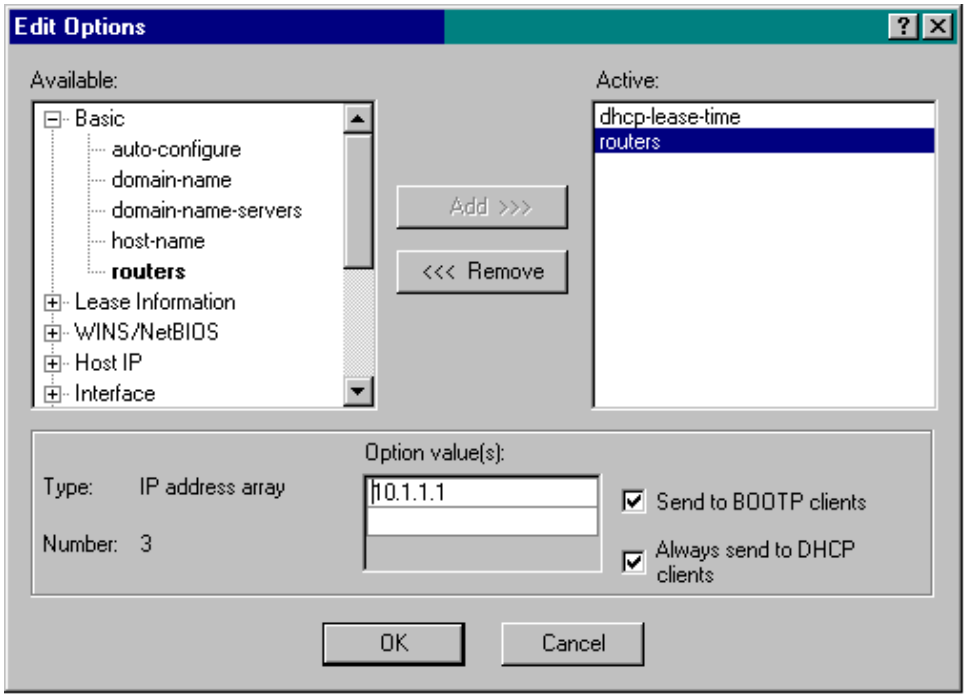

Figure 8. Edit Options Tab

Step 2. Add custom option.

- Expand **Custom** and highlight **ip-phone-image** (**Figure 9**).
- Click the **Add** button and highlight **ip-phone-image** inside the **Active** box.
- Type option 176 string into the **Option value(s)** field. The string should be typed following the exact syntax as displayed below:

MCIPADD=10.1.1.3,MCPORT=1719,TFTPSRVR=10.1.1.6

- Check the box **Send to BOOTP clients** and **uncheck** the box **Always send to DHCP clients.**

*** Very Important Note:** Checking the box **"Always send to DHCP clients"** will force the Cisco Network Registrar to send option 176 to all DHCP clients. If there are other custom options defined for clients other than Avaya IP Telephones, make sure that the box "**Always send to DHCP clients"** associated with these options is **unchecked**. Otherwise, the Cisco Network Registrar will send these options to Avaya IP Telephones and cause registration failures. In **Figure 9**, checking the box "**Send to BOOTP clients"** will tell the Cisco Network Registrar to send option 176 to Avaya IP Telephones only. Unchecking the box "**Always send to DHCP clients"** will prevent the Cisco Network Registrar from sending option 176 to other clients.

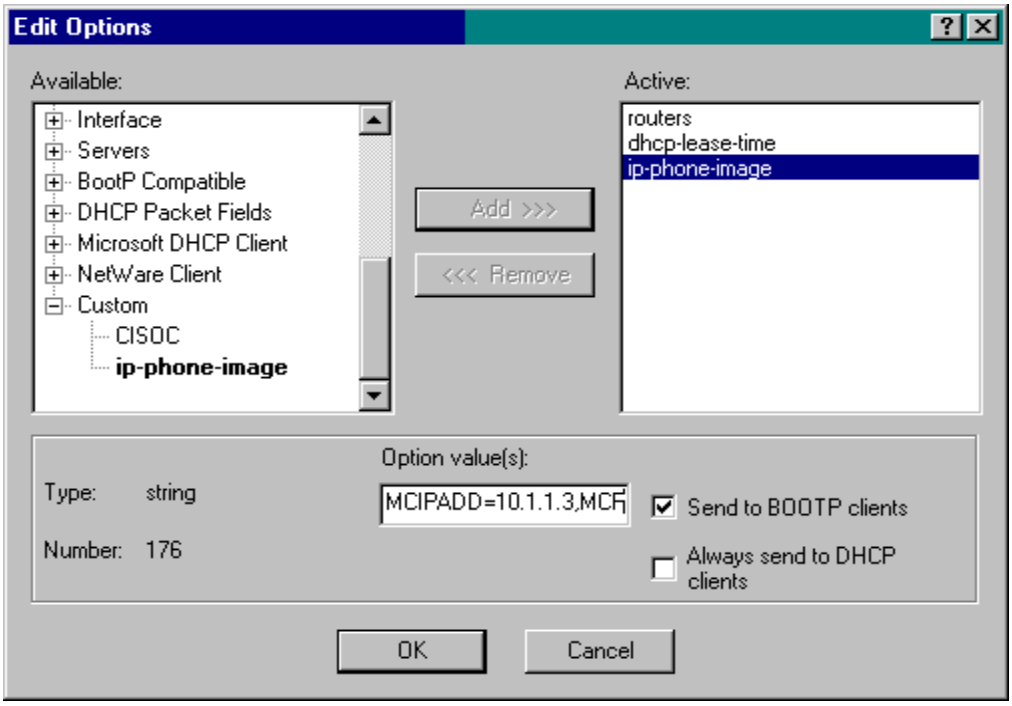

Figure 9. Edit Options Tab

3.5. Configuring DHCP Scopes

- In the **Server Manager** dialog box, highlight the DHCP server **DHCP@4C2_Server.**
- Click **Add** tab (**Figure 10**).

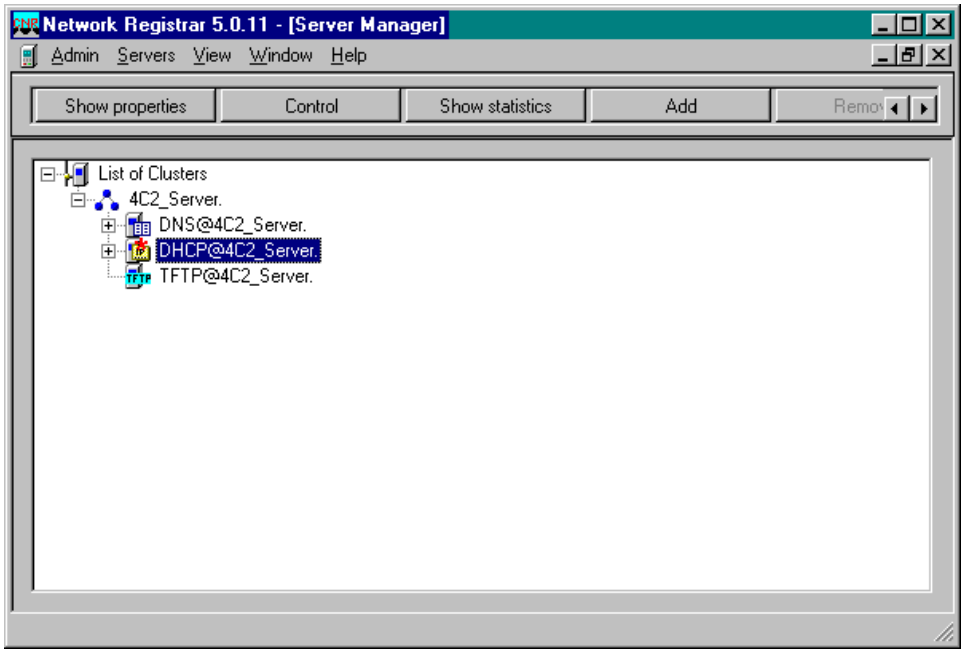

Figure 10. Server Manager Tab

- Populate all information shown below and click **OK**.
- Repeat the procedures for the network 20.1.1.0 scope.
- Reload the server by right clicking the **DHCP@4C2_Server**, selecting **Reload** and clicking **OK** as seen in **Figure 10**.

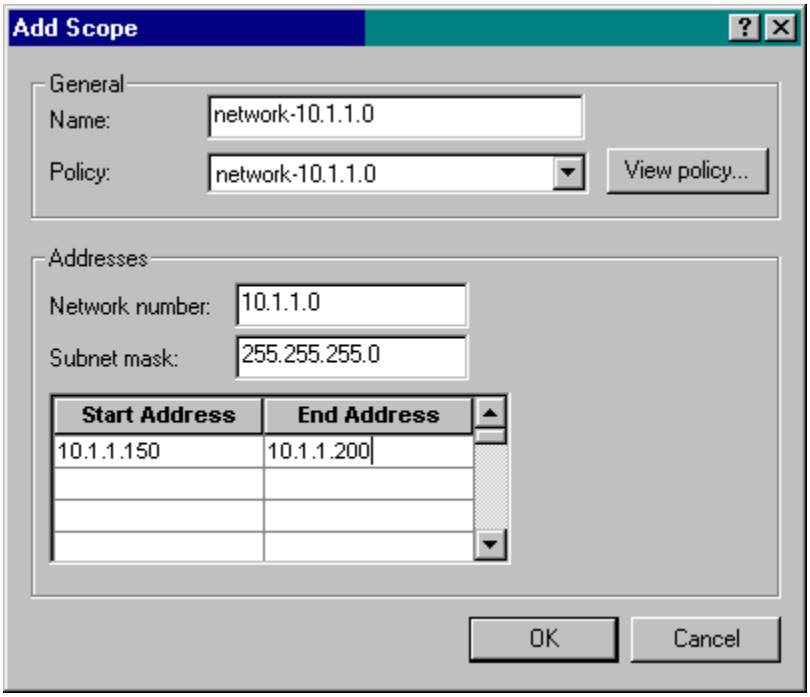

Figure 11. Add Scope Dialog Box

3.6. Check leases

IP address leases can be checked by using the following procedures. Make sure the clients are registered at this point.

- From the **scope property** window, select **Leases** tab.
- Highlight address **10.1.1.150** and click **Lease properties** button **(Figure 12)**.
- **Figure 13** displays the properties for this lease.

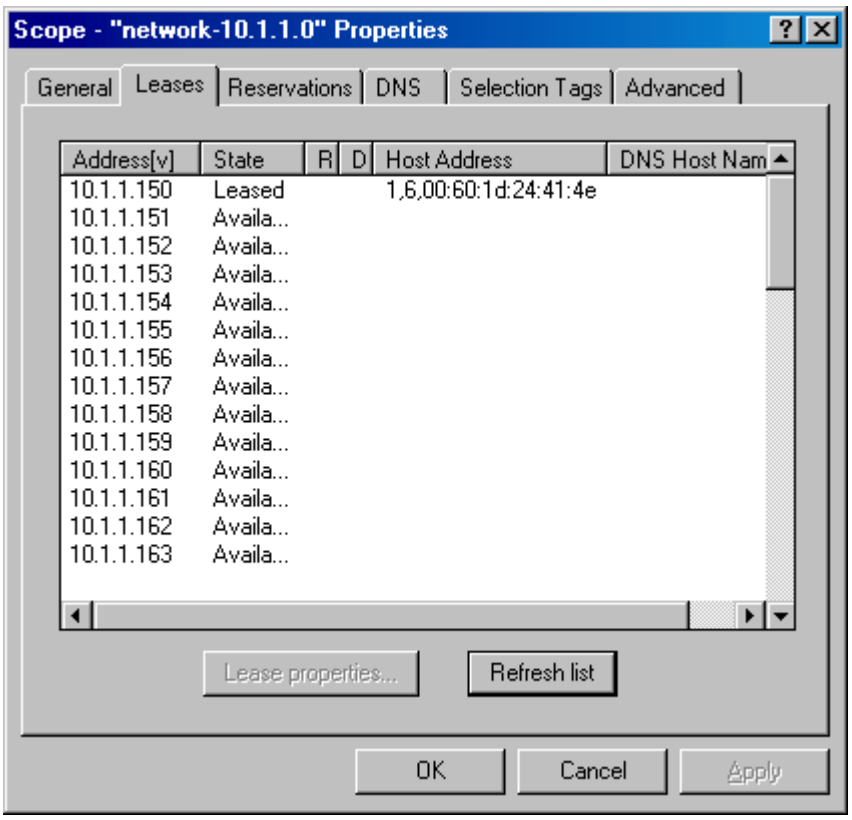

Figure 12. Leases Tab

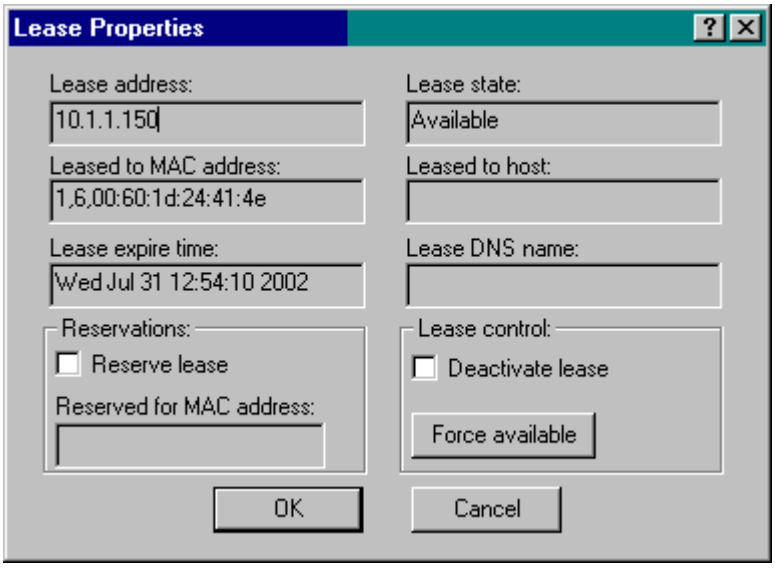

Figure 13. Lease Properties Tab

4. Configure the Cisco 3660 Router

The command ***ip helper-address 10.1.1.6*** is needed for the Cisco 3660 router to forward DHCP requests from clients located at the subnet 20.1.1.0 side to the DHCP server. The related configurations are listed below.

```
interface FastEthernet2/0
 description connection to Catalyst 6509
 ip address 10.1.1.1 255.255.255.0
 duplex full

interface FastEthernet2/1
 description connection to Catalyst 2924
 ip address 20.1.1.1 255.255.255.0
 ip helper-address 10.1.1.6     (allow router to forward DHCP requests to DHCP server.)
 duplex full
```

5. Conclusion

Avaya™ IP telephones and Avaya™ IP Softphones work as DHCP clients with the Cisco Network Registrar as a DHCP server. In order for the Avaya IP telephones to work properly, steps may need to be taken to make sure that the Cisco Network Registrar only sends options that are needed by the Avaya IP telephones.

6. Additional References

"Network Registrar 5.0 User's Guide" by Cisco Systems, Inc.

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya Solution & Interoperability Test Lab at interoplabnotes@list.avaya.com