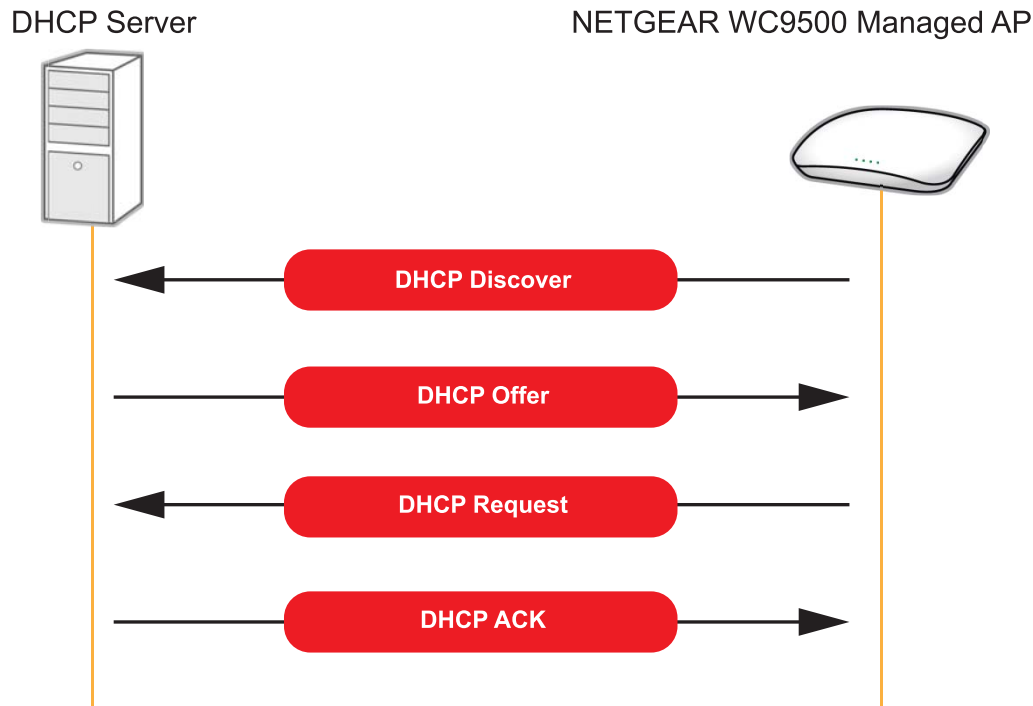


# NETGEAR® ProSAFE® WC9500 High Capacity Wireless Controller

Configuring Microsoft DHCP for the Wireless LAN

## INTRODUCTION

NETGEAR ProSAFE WC9500 High Capacity Wireless Controllers support a wide range of wireless standards. In addition, several vendor-specific DHCP options can either be implemented automatically or they can be specifically assigned to NETGEAR ProSAFE access points managed by the WC9500 via the DHCP server. Standard DHCP options can be supplied to provide the access points with specific network related information while NETGEAR vendor-specific options can be supplied to facilitate discovery by the ProSAFE wireless controller.



## OVERVIEW

Standard and vendor-specific DHCP options are provided to NETGEAR access points with the DHCP Offer and DHCP ACK forwarded from the DHCP server:

1. The NETGEAR ProSAFE access points broadcast a DHCP Discover message onto the physical network to discover available DHCP servers. The DHCP server can be located either on the same IP subnet as the access point, or through a Layer 3 enabled device that supports DHCP forwarding. The Layer 3 devices can forward DHCP packets to a DHCP server on a different IP subnet. The DHCP Discover message will include DHCP option 55 (Parameter Request List) which tells the DHCP server what DHCP options the NETGEAR access points wish to receive from the DHCP scope.
2. When a DHCP server receives a DHCP Discover message from an access point, it reserves an IP address and forwards a lease by sending a DHCP Offer message to the requesting access point. The DHCP Offer will include the IP address to be assigned, as well as any standard and vendor-specific DHCP options that are supported by the device and are assigned to the DHCP scope.
3. A NETGEAR access point may receive DHCP Offers from multiple DHCP servers, but will only accept one of them. Once it has accepted a DHCP Offer, the access point will forward a broadcast DHCP Request message with a transaction ID to inform the available DHCP servers which lease it has accepted. Each DHCP server with a lease that was not accepted will return the offered address to its pool of available addresses.
4. When the DHCP server receives the DHCP Request message from the access point, the DHCP process enters its final phase. The DHCP server serving the lease will forward a DHCP ACK message to the access point that includes the

lease duration and any standard and vendor-specific DHCP options the access point might have requested. At this point, the DHCP IP configuration process is complete.

Each DHCP server must include a DHCP scope for each IPv4 or IPv6 subnet that it serves. Each DHCP scope must include a pool of IP addresses that can be leased to DHCP clients, as well as standard and vendor-specific DHCP options that can be assigned to DHCP clients that lease IP addresses from the scope.

## VENDOR CLASS IDENTIFIER

In some instances it may be desirable to supply unique DHCP options to devices such as NETGEAR ProSAFE access points without creating static DHCP reservations or assigning vendor-specific options directly to the scope.

NETGEAR access points support DHCP option 60 (Vendor Class Identifier) which is forwarded to the DHCP server with the DHCP Discover and ACK that identifies the access point. The DHCP server can filter on the supplied vendor class string and supply specific DHCP options to the access point.

Using the vendor class identifier allows DHCP administrators to assign vendor-specific DHCP options to devices without running the risk of duplicating options within the DHCP scope. For example, it allows an organization to supply separate DHCP option 43 values to different vendor devices. This would not be possible if the option 43 value was assigned directly to the scope.

NETGEAR ProSAFE access points support the following vendor class identifier string:

Device	Vendor Class String
WC9500 Managed Firmware AP	NETGEAR_WNC_AP

## STANDARD DHCP OPTIONS

NETGEAR ProSAFE access points support and implement the following standard DHCP options:

Option	Description
001	Subnet Mask
003	Router
006	Name Server
012	Hostname
015	Domain Name
050	Requested IP Address
051	IP Address Lease Time
053	DHCP Message Type
054	Server Identifier
055	Parameter Request List
060	Vendor Class Identifier
061	Client Identifier

## DHCP Option 001 (Subnet Mask)

The subnet mask option specifies the DHCP client's subnet mask. If both the subnet mask and the router option are specified in a DHCP reply, the subnet mask option **MUST** be supplied first.

Option	Description	Format	Example
001	Subnet Mask	IP Address	255.255.255.0

## DHCP Option 003 (Router)

The router option specifies a list of IP addresses for routers (default gateway) on the DHCP client's subnet. Routers should be listed in order of preference.

This option must be supplied to NETGEAR ProSAFE access points if the NETGEAR ProSAFE WC9500 Wireless Controller is deployed on a separate IP subnet.

Option	Description	Format	Example
003	Router	IP Address	192.168.1.1

## DHCP Option 006 (Name Server)

The domain name server option specifies a list of Domain Name System name servers available to the DHCP clients. DNS servers should be listed in order of preference.

This option must be supplied to NETGEAR access points if DNS name resolution is being used to discover the WC9500 Wireless Controller.

Option	Description	Format	Example
006	Name Server	IP Address	192.168.1.2

## DHCP Option 015 (Domain Name)

The domain name option specifies the domain name that DHCP clients should use when resolving hostnames via the domain name system.

This option must be supplied to NETGEAR access points if DNS name resolution is being used to discover the WC9500 Wireless Controller.

Option	Description	Format	Example
015	Domain Name	String	example.com

## DHCP Option 050 (Requested IP Address)

The requested IP address option allows DHCP clients to request a particular IP address (DHCP Discover).

Option	Description	Format	Example
050	Requested IP Address	IP Address	192.168.1.10

## DHCP Option 051 (IP Address Lease Time)

The IP address lease time option is supplied to DHCP clients along with the DHCP Offer to indicate how long the DHCP server willing to lease the IP address.

Option	Description	Format	Example
051	IP Address Lease Time	Integer	86400

## DHCP Option 053 (DHCP Message Type)

The DHCP message type option is used to convey the type of DHCP message.

Option	Description	Format	Example
053	DHCP Message Type	Integer	1 – DHCP Discover 2 – DHCP Offer 3 – DHCP Request 4 – DHCP Decline 5 – DHCP ACK 6 – DHCP NAK 7 – DHCP Release

## DHCP 054 (Server Identifier)

The server identifier is used in DHCP Offer messages to allow the DHCP clients to distinguish between multiple DHCP lease offers. A DHCP client will indicate which lease offer is accepted by including this option in a DHCP Request message.

Option	Description	Format	Example
054	Server Identifier	IP Address	192.168.10.6

## DHCP 055 (Parameter Request List)

This parameter request list option is used by the DHCP clients to request values for specified configuration parameters.

Option	Description	Format	Example
055	Parameter Request List	Integer	1 – Subnet Mask 3 – Router 6 – Domain Name Server 12 – Hostname 15 – Domain Name 28 – Broadcast Address 43 – Vendor-Specific Information

## DHCP 060 (Vendor Class Identifier)

The class identifier option is used by DHCP clients to identify the type and configuration of a DHCP client. Hardware vendors or administrators may choose to define specific class identifiers to convey particular configuration or other client identification information such as vendor name, model and firmware version.

Option	Description	Format	Example
060	Vendor Class Identifier	String	NETGEAR_WNC_AP

## DHCP Option 061 (Client Identifier)

The client identifier option is used by DHCP clients to specify their unique identifier which contains the hardware type and its IP address.

Option	Description	Format	Example
061	Client Identifier	String	3d0701e091f513c800

## SUB OPTIONS OF NETGEAR DHCP OPTION 43

The following section outlines the sub options of DHCP option 43 supported by NETGEAR ProSAFE access points:

Option	Option Type	Description
2	String	Wireless Controller (WC9500) IPv4 address

## NETGEAR Sub Option 02 (Controller IP Address)

This sub option of DHCP option 43 can be used to provide NETGEAR access points with one or more IP addresses using the NETGEAR Wireless Controller. This allows NETGEAR access points to automatically discover and be managed by the ProSAFE WC9500 Wireless Controller.

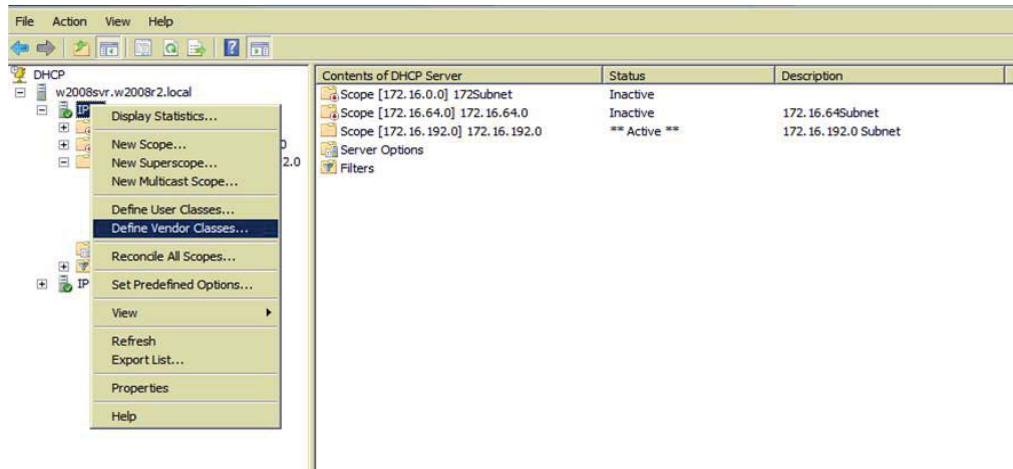
Option	Description	Format	Example
002	Controller IP Address	IP Address (Array)	192.168.0.250 192.168.0.251

## CONFIGURATION

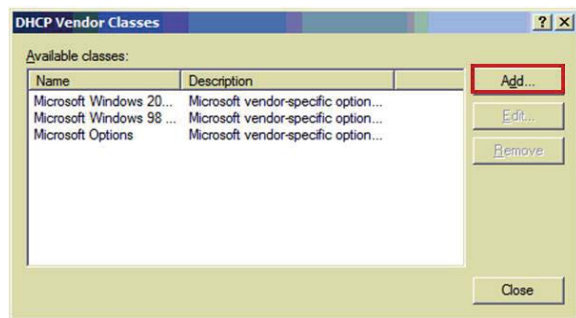
The following configuration example demonstrates how to provision a Microsoft Windows DHCP Server to support vendor class and sub options for NETGEAR access points and apply the vendor class and sub option values to a scope.

### Step 1 – Define Vendor Class

Open the DHCP Snap-In. Right-click on the applicable DHCP server branch and click *Define Vendor Classes*.

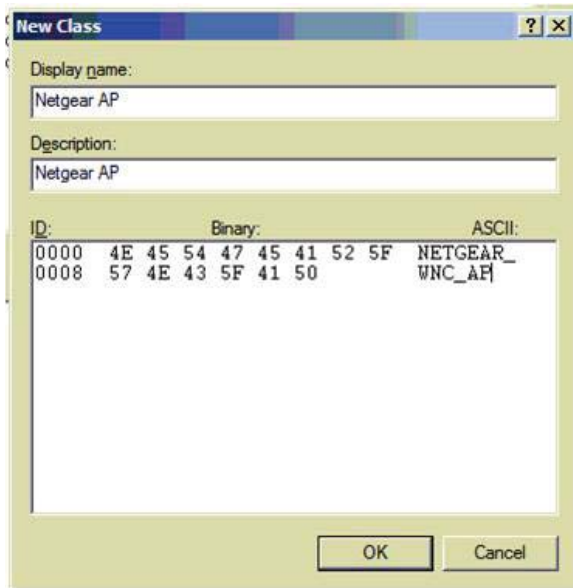


### Step 2 – Select Add



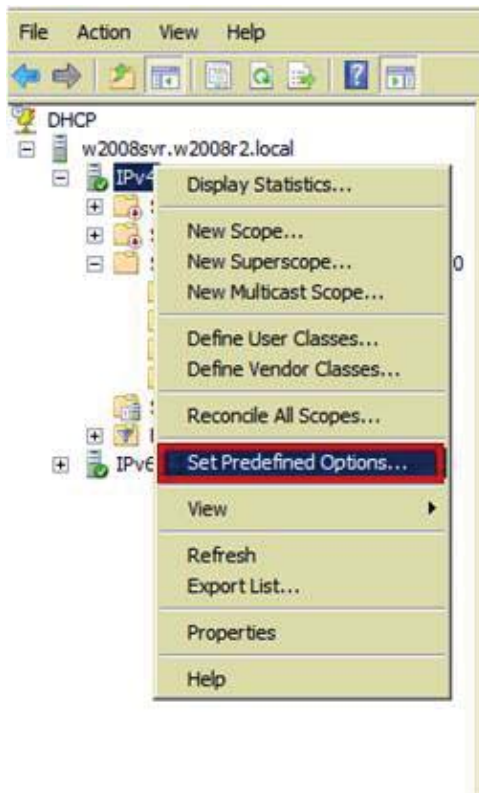
### Step 3 – Define Class

Enter *NETGEAR AP* in the Display name field and *NETGEAR\_WNC\_AP* in the ASCII field. If desired, enter a description of your choice.



### Step 4 – Define NETGEAR Sub-Options

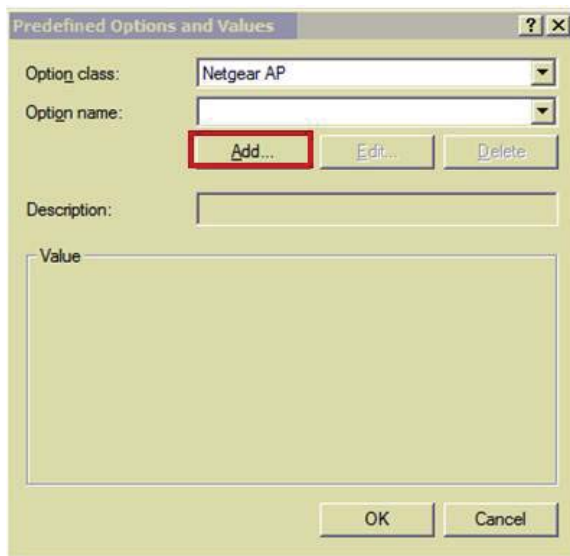
Right-click on the applicable DHCP server branch and select *Set Predefined Options*.





## Step 5 – Add Option Class

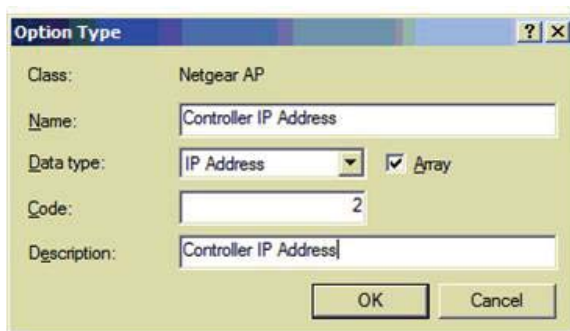
In the *Predefined Options and Values* window, select *NETGEAR AP* from the *Option Class* pulldown list and click *Add*.



The screenshot shows the 'Predefined Options and Values' dialog box. The 'Option class' dropdown menu is set to 'Netgear AP'. Below it, the 'Option name' dropdown is empty. The 'Add...' button is highlighted with a red rectangular box. To the right of 'Add...' are 'Edit...' and 'Delete' buttons. Below these is a 'Description' text field. A large 'Value' text area is at the bottom. At the very bottom are 'OK' and 'Cancel' buttons.

## Step 6 – Define the Sub Option

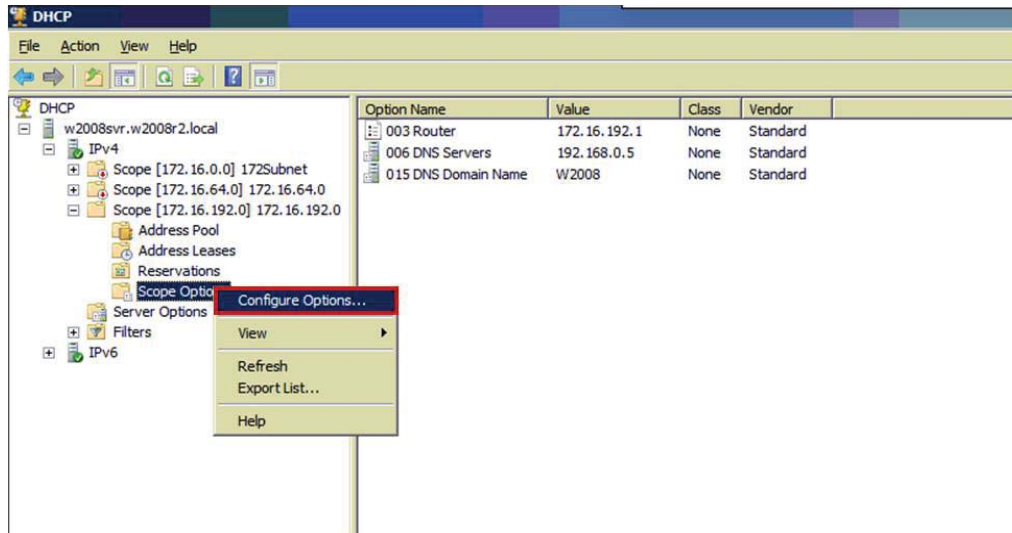
To enable discovery by the NETGEAR ProSAFE WC9500 Wireless Controller, define the sub option as shown below.



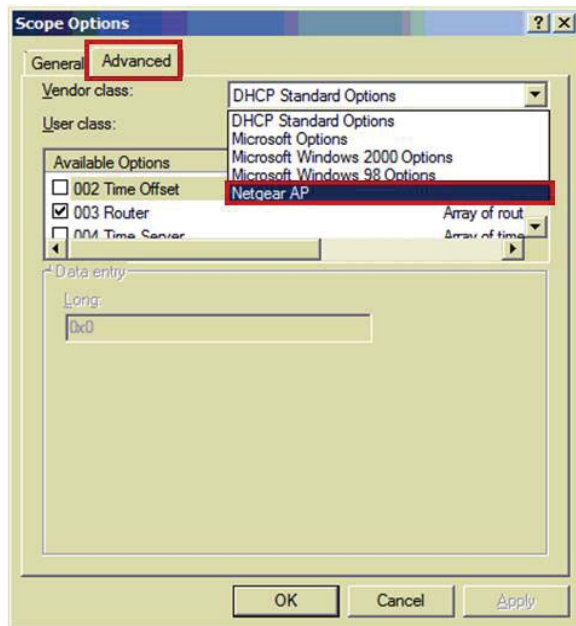
The screenshot shows the 'Option Type' dialog box. The 'Class' is set to 'Netgear AP'. The 'Name' text field contains 'Controller IP Address'. The 'Data type' dropdown is set to 'IP Address' and the 'Array' checkbox is checked. The 'Code' text field contains '2'. The 'Description' text field contains 'Controller IP Address'. At the bottom are 'OK' and 'Cancel' buttons.

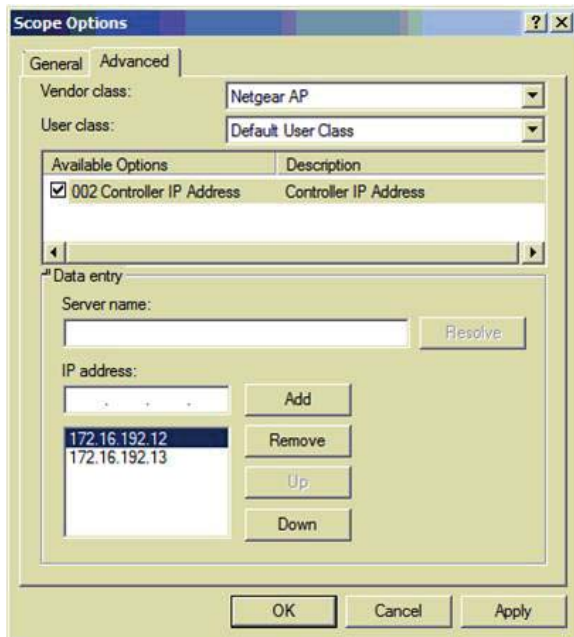
## Step 7 – Assign NETGEAR Sub Options and Values to a Scope

Right-click on a scope supporting the ProSAFE access points and select *Configure Options*.

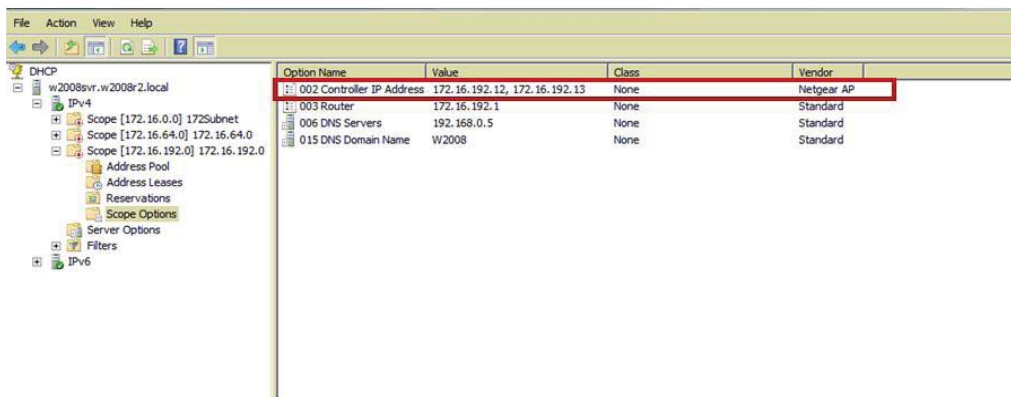


## Step 8 – Enable discovery by the ProSAFE WC9500 Wireless Controller





**Please Note:** Configured scope options and values will be displayed in the DHCP scope and will only be assigned to NETGEAR ProSAFE access points that are being served from the scope.



## SUMMARY

Using the NETGEAR ProSAFE WC9500 High Capacity Wireless Controller, we were able to provision a Microsoft Windows DHCP Server to support vendor class and sub options for NETGEAR access points, and then apply the vendor class and sub option values to a scope.