

## Role of DHCP Server in Network

<sup>1</sup> Mahantesh B Patil, <sup>2</sup> Dr. RV Kulkarni

<sup>1</sup> Assistant Professor, Department of Computer Studies, Chhatrapati Shahu Institute of Business Education and Research (CSIBER) College, Shivaji University, Kolhapur, Maharashtra, India

<sup>2</sup> Professor, Department of Computer Studies Chhatrapati Shahu Institute of Business Education and Research (CSIBER) College, Shivaji University, Kolhapur, Maharashtra, India

### Abstract

Dynamic Host Configuration Protocol (DHCP) plays an important role in network. DHCP assigns the IP addresses to different computers (desktops) installed in an organization dynamically. In this paper authors have proposed a network model for an organization using DHCP with MAC binding. The DHCP server can allocate IP addresses dynamically to DHCP client.

**Keywords:** DHCP, MAC, DNS, Windows 2003, Windows 2008

### Introduction

Dynamic Host Configuration Protocol abbreviated as DHCP is employed in a network for assigning IP addresses dynamically. This allows the network administrator to exemplify an IP address pool for the clients, so he/she could monitor the entire system without running from machine to machine changing arrangements when there are any IP clashes. Thus DHCP provides fast, programmed and focal administration of IP addresses in a system.

In a large network where huge number of hosts are associated it is very difficult for a network administrator to manage Reliable IP address arrangement for every host. In an organization for a large network with more than 1000 desktop computers needs allocation of IP address, subnet mask, default gateway, DNS servers, and other network settings. Manual computation of these tasks is time consuming. There is a possibility of entering wrong IP address or duplication of the IP address. DHCP automatically assign an IP address from a pool of available addresses. DHCP is additionally used to arrange the best subnet mask, default gateway, and DNS server information on the device.

#### a) Review of Literature

In the paper Design and Implementation of a Network Security Model for Cooperative Network Salah Alabady (2015) presented a network security model. In this paper author has analyzed vulnerabilities, threats, attacks, configuration weaknesses and security policy in respect of network protection [2].

Mohammed Nadir Bin Ali and others in the paper Design and Implementation of a Secure Campus Network have configured. A hierarchical architecture of the campus network considering different types of security issues which ensures quality of service [3].

Kartik Pandya in the paper Network Structure discussed five basic network topologies like Bus, ring, Star, Tree and Mesh [4].

Off or, Kennedy and others have implemented Structured Network for a Small Office. Authors have simulated network

design using Cisco Packet Tracer™ software and Wire Shark protocolanalyser [5].

All the above papers that are reviewed have suggested different aspects of network design, topologies and implementation but they have not discussed problem faced in practical implementation. Authors have not discussed DHCP and MAC binding in detail.

DHCP is nothing but Dynamic Host Configuration Protocol. It will assigns IP addresses dynamically. We can define an IP address pool for the clients, so that we could keep track of the whole network without running from machine to machine changing configurations when there is any IP conflicts. It will provide quick, automatic and central management for the distribution of IP addresses in a network. In a large network (e.g. typically collages or a Hospital), where thousands of host can be connected and removed from the network anytime. In this case, for a network administrator, it is very difficult to maintain Reliable IP address configuration for each host. Also DHCP helps to achieve plug and play functionality for the DHCP client enabled devices. DHCP which dynamically sets the IP addresses and gets tuned to the users requirements. The different computer labs from the VLAN i.e. Virtual Lans are configured and assigned the IP with MAC Binding as per the requirements at the institute. Only the admin has the privileges to interact with the DHCP server. The model proves to be extensively user friendly for all levels of users.

Every educational institution has a mandatory requirement of installing multiple operating systems and/or computing environments which is in line with the academic curriculum followed by the institution. In the proposed study the researcher want to develop a model for the smooth functioning of a computer lab using DHCP which dynamically sets the IP addresses and gets tuned to the user's requirements. The different computer labs from the VLAN i.e. Virtual Lans are configured and assigned the IP with MAC Binding as per the requirements at the institute. Only the admin has the privileges to interact with the DHCP server. The model proves to be extensively user friendly for all levels of users.

An Institute network has a number of uses, such as teaching, learning, research, management, e-library, result publishing and connection with the external users. Network security will prevent the institute network from different types of threats and attacks.

**b) Proposed Methodology**

The prime objective of the proposed research is to incorporate DHCP to deal IP address allocation, TCP/IP settings for DNS, Default Gateway, and so forth by managing DHCP settings automatically.

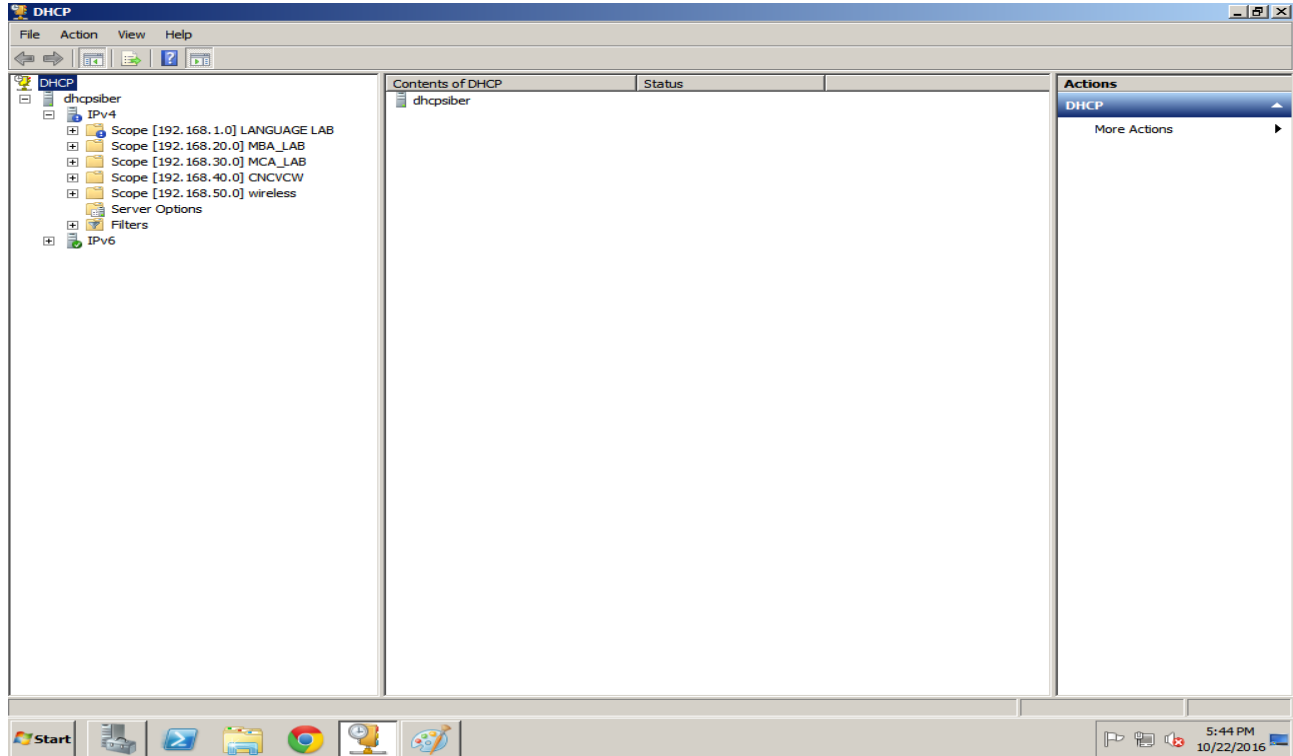


Fig 1

**2. Structural Design**

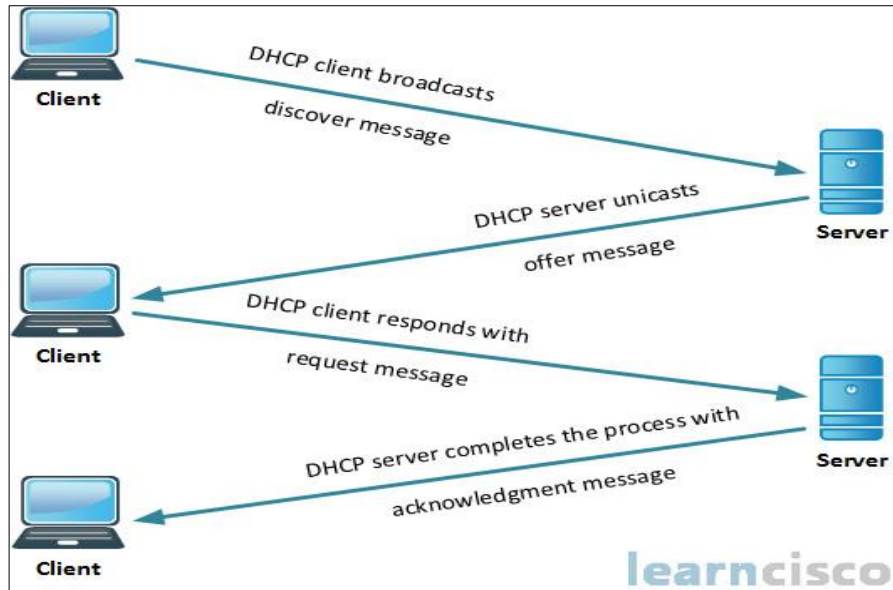


Fig 2

**3. Implementations**

DHCP Scope is range of IP addresses assigned to (computers) desktops requesting dynamic IP addresses. This sections elaborates implementation details of DHCP at network

includes 1000 desktops.

For example, if one set a scope with a range from 192.168.30.2-192.168.30.254, From this range IP addresses are assigned to the clients.

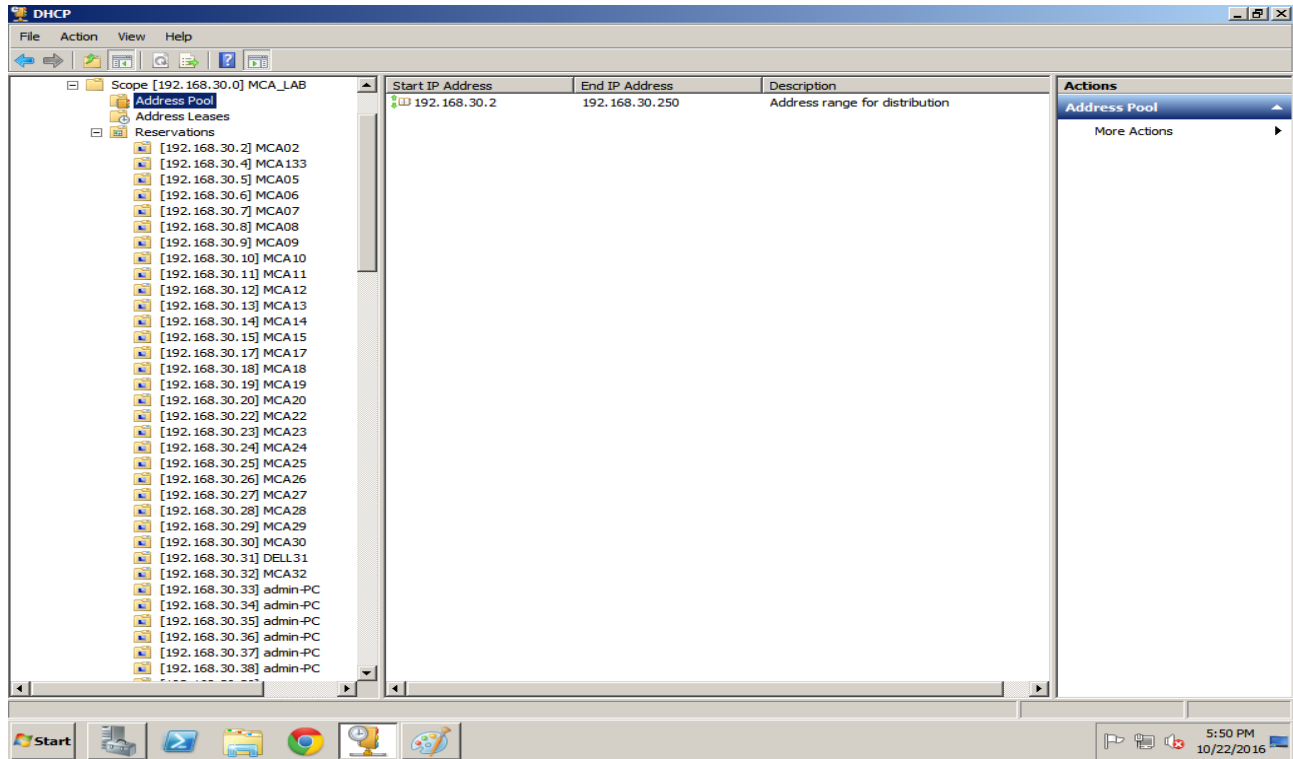


Fig 3

One can also create more than one scope, but one has to check that the scopes aren't duplicating one another. At the scope creation process one can add some more TCP/IP parameters such as subnet mask, IP addresses lease time, router (default

gateway), DNS servers, etc. so when the clients get the IP addresses they'll will also get the other parameters from the scope.

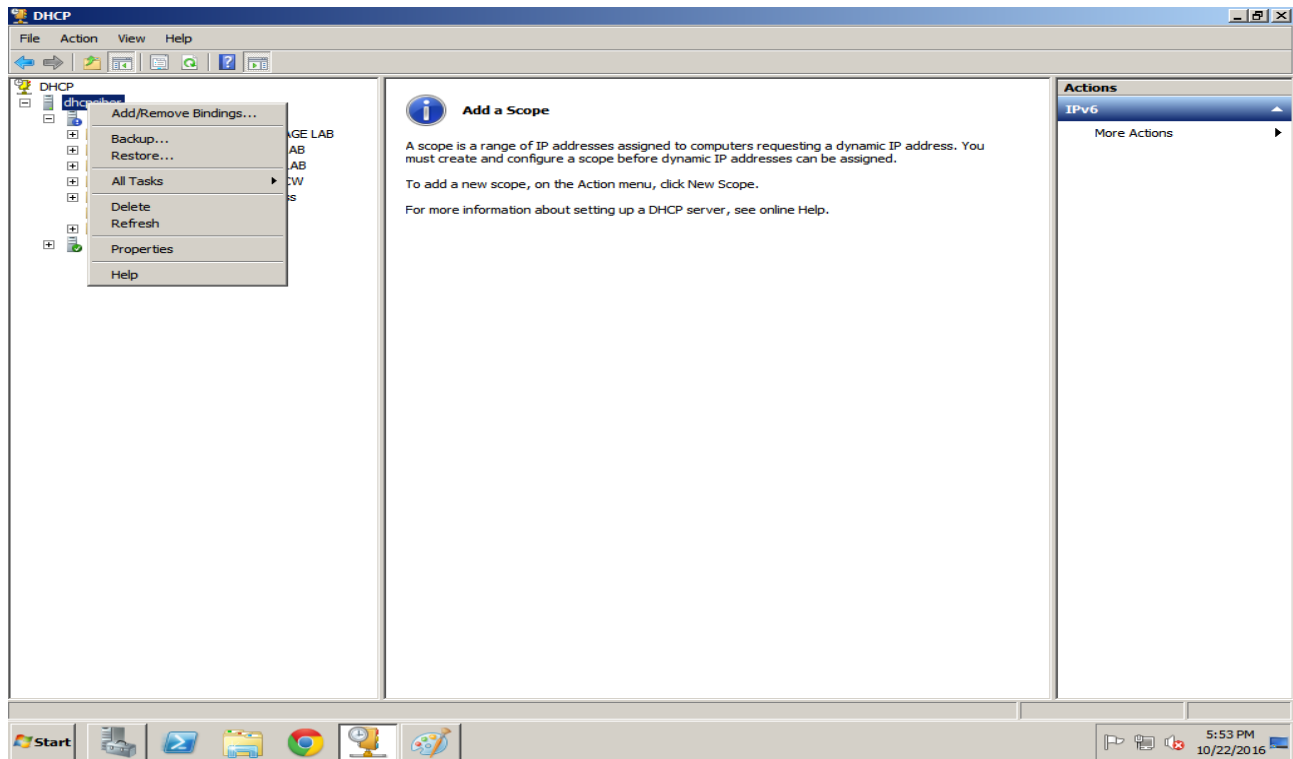


Fig 4

In some cases, one can to prevent the client using some addresses, for example if scope is from 192.168.30.2 up to 192.168.30.254, and we have assigned servers

IP's 192.168.30.250-192.168.30.254, we can exclude these IP addresses from the scope and exclude the DHCP, in most of the DHCP servers this option called exclude.

Reservation is a great option if one can planning to provide Static (fix) IP address from the DHCP server to unique DHCP client. If for example in the 10.0.0.1-10.0.0.100 scope you want to provide for specific client a unique address that will be

always of the client, one can easily set reservation for the client using a unique identifier – the MAC address, the MAC of Media Access Control is a unique hexadecimal physical address for network adapters.

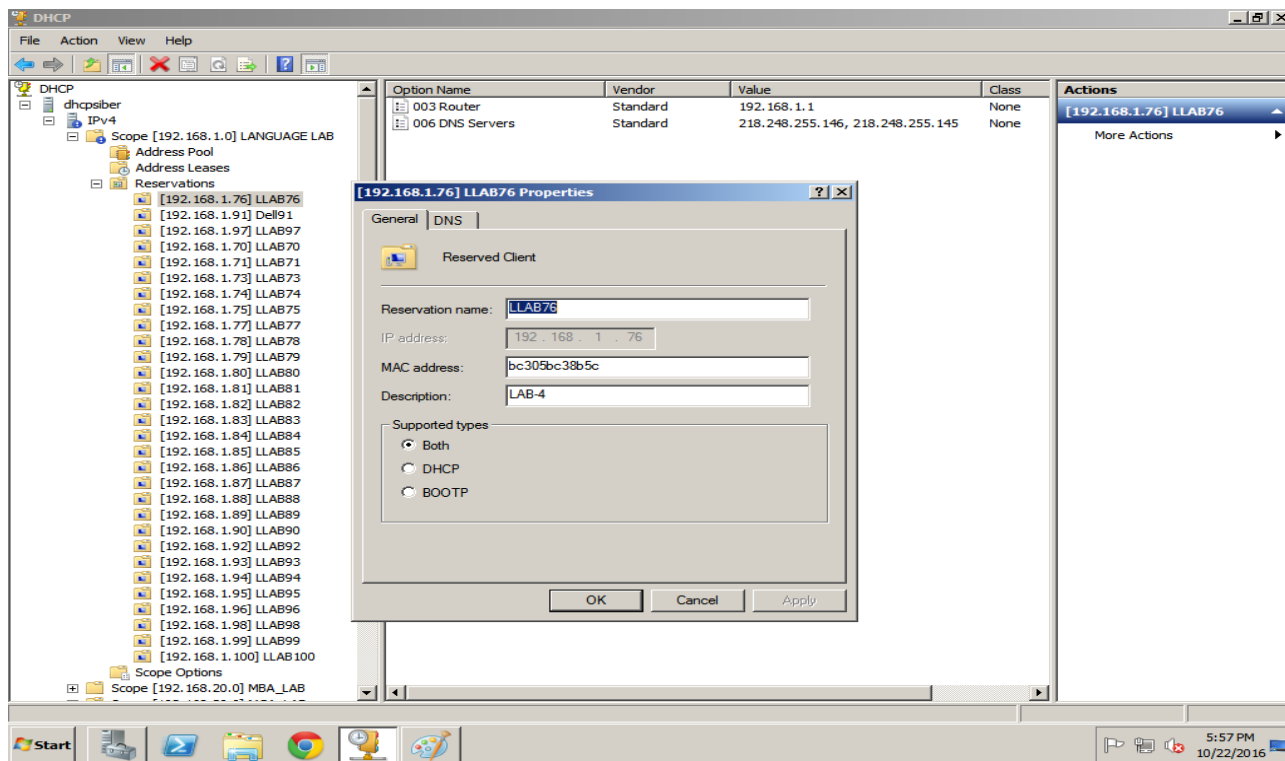


Fig 5

DHCP is a critical “must have” network service because using DHCP helps you, as a System/Network Administrator, to manage your clients by assigning, tracking and re-assigning IP addresses.

A computer, or any other device that connects to a network (local or Internet), must be properly configured to communicate on that network. Since DHCP allows that configuration to happen automatically, it's used in almost every device that connects to a network including computers, switches, smartphones, gaming consoles, etc.

Due to dynamic IP address assignment, there's less of a chance that two devices will have the same IP address, which is very easy to run into when using manually-assigned, static IP addresses.

Using DHCP also makes a network much easier to manage. From an administrative point of view, every device on the network can get an IP address with nothing more than their default network settings, which is setup to obtain an address automatically. The only other alternative is to manually assign

addresses to each and every device on the network.

Because these devices can get an IP address automatically, they can move freely from one network to another (given that they're all setup with DHCP) and receive an IP address automatically, which is super helpful with mobile devices.

In most cases, when a device has an IP address assigned by a DHCP server, that IP address will change each time the device joins the network.

If IP addresses are assigned manually, it means administration must not only give out a specific address to each new client, but existing addresses who are already assigned IP must be manually *unassigned* for any other device to use that same address. This is not only time-consuming, but manually configuring each device increases the chance of running into human-made errors.

A DHCP server defines a scope, or *range*, of IP addresses that it uses to serve devices with an address. This pool of addresses is the only way a device can obtain a valid network connection.

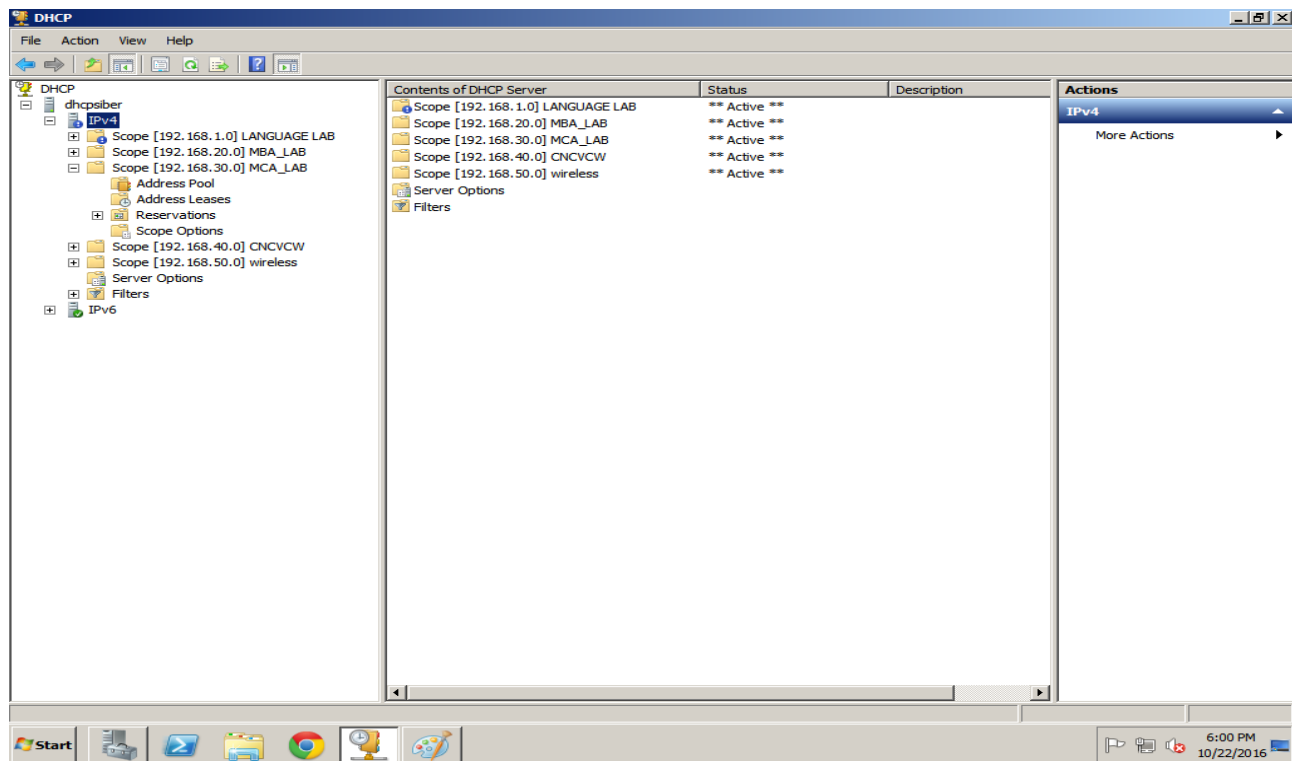


Fig 6

This is another reason DHCP is so useful - because it allows lots of devices to connect to a network over a period of time without needing a massive pool of available addresses. For example, even if only 20 addresses are defined by the DHCP server, 30, 50, or even 200 (or more) devices can connect to the network so long as no more than 20 are using one of the available IP address concurrently.

DHCP assigns IP addresses for a specific period of time (a *lease* period), using commands like `ipconfig` to find your computer's IP address will yield different results over time.

Though DHCP is used to deliver dynamic IP addresses to its clients, it doesn't mean static IP addresses can't also be used at the same time. A mixture of devices that are getting dynamic addresses and devices that have their IP addresses manually assigned to them, can both exist on the same network.

ISP (Internet Service Provider) uses DHCP to assign IP addresses. This can be seen when identifying your public IP address. It will likely change over time unless your home network has a static IP address, which is usual in the case of businesses who can access web services publicly.

### Step to Configure DHCP Server

Installing DHCP Server on the windows server.

**Step I:** Go to Administrative Tools of the windows server, select control panel.

**Step II:** Add remove programs select Add remove windows components

**Step III:** Select Networking services and install DHCP

**Step IV:** After installing DHCP go administrative tools then Right click on DHCP click author

**Step V:** It will open the dhcp windows right click on comp name i.e. server name

**Step VI:** Select new scope then click next Select name and description

**Step VII:** Assign the DHCP ip range Then click on next

**Step VIII:** Then give router default gateway i.e. server ip Give the server name and press resolve.

**Step IX:** Add ip address of server then click on next

**Step X:** Yes I want to active this scope then finish

### Step to Configure DHCP Client

- Go to my network places
- Select tcp/ip properties
- Click on obtain ip address automatically.
- Click on obtain dns address automatically.
- Go to command prompt
- Type `ipconfig (space) /Release`
- Type `ipconfig (space) /Renew`
- To remove the DHCP ips from client
- Type `ipconfig (space) /flushdns`

Dynamic changing IP addresses should not be used for devices that are stationary and need constant access like printer and file server. For example if a network printer has an IP address that changes at some point of time in the future, then all the desktops ( computers) settings connected to that printer have to be updated regularly. The same is true for the remote access. Presently all the printers are having network port so DHCP server can be used for configuration and which aids in assigning IP address dynamically.

### Conclusion

In the current work, authors have implemented DHCP with MAC binding. The distinctive computer labs from Virtual LANs are arranged and allocated the IP with MAC Binding according to the requirements at the organization. Only the administrator has the benefits to associate with the DHCP server. The model turns out to be widely easy to understand for all levels of users. The entire network is planned to be

automatic which involves minimum user intervention. Multiple users can be created and different access levels can be assigned for the valid users.

## References

1. Network Topology [On-Line] Available at. <http://en.wikipedia.org> Andrews Tananbaum: Computers Networks, PHI
2. Salah Alabady. Design and Implementation of a Network Security Model for Cooperative Network
3. International Arab Journal of e-Technology. 2009, 1(2).
4. Mohammed Nadir Bin Ali, Mohamed Emran Hossain, Md. Masud Parvez. Design and Implementation of a Secure Campus Network International Journal of Emerging Technology and Advanced Engineering Website, 2015, 5(7). [www.ijetae.com](http://www.ijetae.com) (ISSN 2250-2459, ISO 9001:2008 Certified Journal).
5. Kartik Pandya. 2013, 1(2).
6. International Journal of Advance Research in Computer Science and Management Studies Network Structure or Topology
7. Offor, Kennedy J, Obi, Patrick I, Nwadike Kenny T, Okonkwo II. International Journal of Engineering Research & Technology (IJERT), 2013, 2(8).
8. Structured Network Design and Implementation for a Small Office Home Office - Tutorial/Report "Intranet." Wikipedia, The Free Encyclopedia. 2008, 10:43 UTC. Wikimedia Foundation, Inc. 2 Jul 2008
9. Mark R, Roberta B, Keith S. Network Security: The Complete Reference [M]. Osborne: McGraw-Hill Osborne Media, 2003.
10. Kwot T. Fung Network Security Technologies, Second Edition [M]. AUERBACH, 2004/10/28, 11-123.
11. Joel S, Stuart M, George K. Hacking Exposed: Network Security Secrets & Solutions [M]. McGraw-Hill, April 2005:23-126.