Federal TVET Institute
Department of Information Communication Technology
Master of ICT Teachers Education

Learning Guide 3: Web Server Management and Services

(IIS, FTP, DHCP and DNS)

Information Sheet 3.2: Implementing DNS and DHCP Server

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3.3 What is DNS?

3.3.1 Overview of DNS Server

The **Domain Name System** (**DNS**) is a hierarchical distributed naming system for computers, services, or any resource connected to the Internet or a private network. It associates various information with domain names assigned to each of the participating entities. Most prominently, it translates domain names, which can be easily memorized by humans, to the numerical IP addresses needed for the purpose of computer services and devices worldwide. The Domain Name System is an essential component of the functionality of most Internet services.

The Domain Name System (DNS) is a standard technology for managing public names of Web sites and other Internet domains. DNS technology allows you to type names into your Web browser like www.tveti.edu.et and your computer to automatically find that address on the Internet. A key element of the DNS is a worldwide collection of *DNS servers.*

A **DNS server** is any computer registered to join the Domain Name System. A DNS server runs special-purpose networking software, features a public IP address, and contains a database of network names and addresses for other Internet hosts

3.3.1 How DNS Works

The DNS is a distributed system, meaning that only the 13 root servers contain the complete database of names and addresses. All other DNS servers are installed at lower levels of the hierarchy and maintain only certain pieces of the overall database.

Most lower level DNS servers are owned by businesses or Internet Service Providers (ISPs). For example, Google maintains various DNS servers around the world that manage the google.com, google.co.uk, and other domains. Your ISP also maintains DNS servers as part of your Internet connection setup.

DNS networking is based on the client / server architecture. Your Web browser functions as a DNS client (also called *DNS resolver*) and issues requests to your Internet provider's DNS servers when navigating between Web sites.

When a DNS server receives a request not in its database (such as a geographically distant or rarely visited Web site), it temporarily transforms from a server to a DNS client. The server automatically passes that request to another DNS server or up to the next higher level in the DNS hierarchy as needed. Eventually the request arrives at a server that has the matching name and IP address in its database (all the way to the root level if necessary), and the response flows back through the chain of DNS servers to your client.

3.3.3 DNS Servers and Home Networking

Computers on your home network locate a DNS server through their Internet connection setup properties. Providers give their customers the public IP address(es) of primary and backup DNS servers. You can find the current IP addresses of your DNS server configuration via several methods:

- on the configuration screens of a home network router
- on the TCP/IP connection properties screens in Windows Control Panel (if configured via that method)
- from ipconfig (windows) / ifconfig (linux) or similar command line utility

DNS Server: An Example

If you've ever used the Internet, it's a good bet that you've used the **Domain Name System**, or **DNS**, even without realizing it. DNS is a protocol within the set of standards for how computers exchange data on the Internet and on many private networks, known as the TCP/IP protocol suite. Its basic job is to turn a user-friendly **domain name** like "**tveti.edu.et**" into an Internet Protocol (IP) address like **70.42.251.42** that computers use to identify each other on the network. It's like your computer's GPS for the Internet.

Computers and other network devices on the Internet use an IP address to route your request to the site you're trying to reach. This is similar to dialing a phone number to connect to the person you're trying to call. Thanks to DNS, though, you don't have to keep your own address book of IP addresses. Instead, you just connect through a **domain name server**, also called a **DNS server** or **name server**, which manages a massive database that maps domain names to IP addresses.

Whether you're accessing a Web site or sending e-mail, your computer uses a DNS server to look up the domain name you're trying to access. The proper term for this process is **DNS name resolution**, and you would say that the DNS server resolves the domain name to the IP address. For example, when you enter "http://www.tveti.edu.et" in your browser, part of the network connection includes resolving the domain name "**tveti.edu.et**" into an IP address, like **70.42.251.42**, for TVET Institute's Web servers.

You can always bypass a DNS lookup by entering 70.42.251.42 directly in your browser (give it a try). However, you're probably more likely to remember "Tveti.edu.et" when you want to return later. In addition, a Web site's IP address can change over time, and some sites associate multiple IP addresses with a single domain name.

Without DNS servers, the Internet would shut down very quickly. But how does your computer know what DNS server to use? Typically, when you connect to your home network, Internet service provider (ISP) or WiFi network, the modem or router that assigns your computer's network address also sends some important network configuration information to your computer or mobile device. That configuration includes one or more DNS servers that the device should use when translating DNS names to IP address.

So far, you've read about some important DNS basics. The rest of this article dives deeper into domain name servers and name resolution. It even includes an introduction to managing your own DNS server. Let's start by looking at how IP addresses are structured and how that's important to the name resolution process.

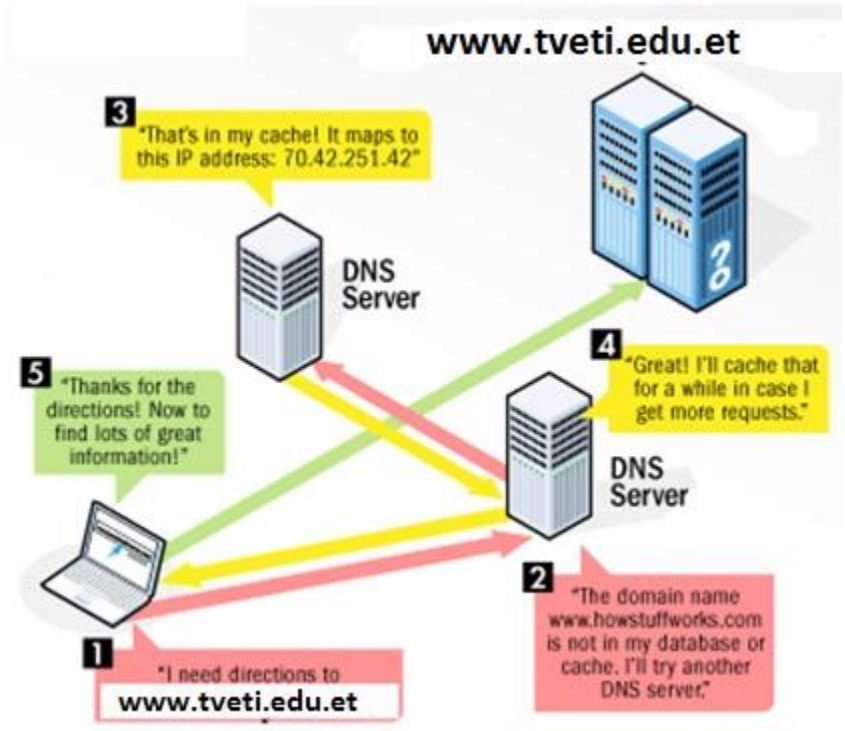

Figure 3.5 – DNS Server

3.4 What is DHCP?

3.4.1 Overview of DHCP Server

Computer networks can be of any form like a LAN, WAN etc. If you are connected to a local LAN or an internet connection, the IP addresses form the basis of communication over computer networks. An IP address is the identity of a host or a computer device while connected to any network.

The **Dynamic Host Configuration Protocol** (**DHCP**) is a standardized network protocol used on Internet Protocol (IP) networks for dynamically distributing network configuration parameters, such as IP addresses for interfaces and services. With DHCP, computers request IP addresses and networking parameters automatically from a DHCP server, reducing the need for a network administratoror a user to configure these settings manually.

Dynamic Host Configuration Protocol is used by computers for requesting Internet Protocol parameters, such as an IP address from a network server. The protocol operates based on the client-server model. DHCP is very common in all modern networks ranging in size from home networks to large campus networks and regional Internet service provider networks. Most residential network routers receive a globally unique IP address within the provider network. Within a local network, DHCP assigns a local IP address to devices connected to the local network.

DHCP (Dynamic Host Configuration Protocol) Server simplifies the management of IP address configuration by automating address configuration for network clients. All computers that participate on TCP/IP networks or the Internet need to have IP addresses assigned to them and have other IP information configured. IP addresses allow computers and other network hosts to communicate with other computers or hosts on the network.

3.4.2 How DHCP Server Works?

Some of the additional information needed by network clients may include a subnet mask, default gateway and DNS server information. This information is needed in order for the computer to do things such as send data outside the network and resolve host names to IP addresses. Rather than manually inputting all of this information on each client, DHCP can do this for you automatically once its setup on the DHCP server.

In order for DHCP to work you need to have a device acting as a DCHP server. This device can be a computer, router or other type of network device. The DHCP server is configured with a range or ranges of IP addresses that can be used to give to clients that request one. It can also be configured with other network parameters as stated earlier.

For a client to be able to obtain information from a DHCP server it must be DHCP enabled. When it is configured this way then it will look for a DHCP server when it starts up

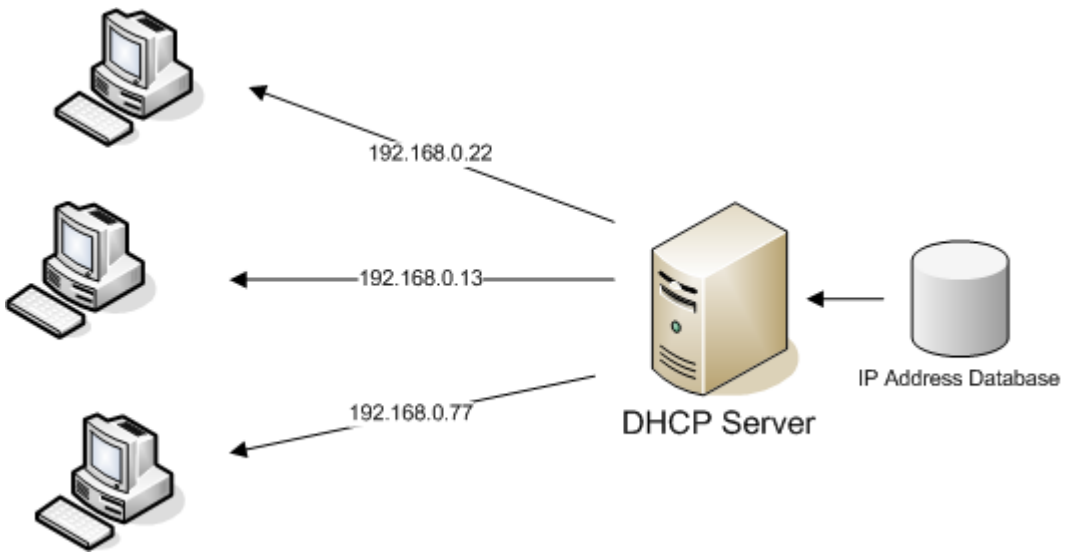

Figure 3.6 – DHCP Server

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