Administration of DHCP Addressing

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Abstract: The Dynamic Host Configuration protocol (DHCP) is a protocol that is designed to help in automate the process of IP configuration and the rest of network parameters to the host in the network. The DHCP has a unique and important features which are make its address administration very efficient especially nowadays with the proliferation of mobile devices with the patterns that have a transient network access. With a large network or with a mobile ad-hoc network, the administrator will face an impossibility to configure the IP and the rest of network parameters of the host in the network because there will be many wrongs or there will be no infrastructure.

One of the most important features of DHCP is that the same IP will not be allowed to be used at the same time between two hosts or network cards in DHCP mechanism.

The misconfigurations or misbehavior of the host will prevent the DHCP to work properly. Our focus in this paper is to discuss the address administration of DHCP over performance and vulnerabilities in operational networks today. Moreover, we will try to display how the misconfigurations of the host could affect the DHCP and how we will be able to get rid or reduce these misconfigurations.

Keywords: Dynamic Host Configuration protocol (DHCP), administration.

1. INTRODUCTION

In order to locate the network due to the device that is located with this network, we have to use the IP address to do achieve the location, and the Media Access Control (MAC) address is uniquely used to identify each device in the local area network. The Media Access Control (MAC) address consists of forty eight bits long with twelve hexadecimal numbers. The first six numbers are called as an Organizational Unique Identifier (OUI) and they are used to uniquely identifying the manufacturer. The rest of the numbers are the serial number of the interface. When we want to transmit a packet, we have to use the network bits of the network where the 32-bit device is located and the host bits of the device on the network (Dai & Chiang, 2007).

DHCP has emerged as a protocol for the centralized administration of hosts, temporary uses of address such as mobile hosts, and for the administration of the frequently changing IP addresses (Park, Ahn, Chung, Lee, & Park, 1997).

2. THE ADVANTAGES OF DHCP

This protocol which is stands for dynamic host configuration protocol is designed to provide the following desirable features as follows (Mcauley & Manousakis, 2000):

It has ability to work with both wired and wireless network, it is not required for any manual configuration, it provides a direct routing, it allows any node to be going on and going off without any operation of re-register, it provides the relay agents to be used to allow the domain to be with a single network server, and it has the popularity with the most modern enhancement mechanism like authentication, lightweight directory access protocol (LDAP) database administration, and the dynamic updating of the domain name system (DNS).

3. NEED FOR DHCP DEBUGGING

DHCP is a protocol designed to automate address management in networks. To operate properly, a DHCP server relies on the clients to follow the protocol specifications. Clients that break the protocol can greatly reduce efficiency of address usage in the network. The detection of misconfigured clients is often non-trivial in a reasonably-sized network.

In addition, the recent proliferation of mobile devices has made networks more dynamic and has put more strain on the performance of DHCP. Mobile hosts have transient network access patterns and DHCP must be properly configured to efficiently recycle unused addresses of these transient hosts back to the pool of available addresses. Hence, it is important to study the performance of DHCP, identify the common causes of address related problems, and define techniques that will allow administrators to quickly and efficiently remedy such situations in networks today.

4. PROBLEMS POTENTIALLY ASSOCIATED WITH DHCP

The DHCP provides network configuration parameters automatically. There are two primary reasons make the DHCP attractive to network management: The first reason is that any host on the network can be configured automatically through a centralized point of IP address administration. The second reason is that the networks with a limited number of IP addresses can be configured with DHCP to reclaim IP addresses of transient hosts for reassignment (Park, Ahn, Chung, Lee, & Park, 1997).

Lease with DHCP is referred to the set of configuration parameters which are provided by a DHCP server to any host. The IP address is identified each lease. Basically a host is broadcasting a discover message as a trial to discover the available DHCP server. Then the DHCP server responds to this demand by providing an offer message which includes an offer for address lease. If a host then receives the offer, it will request a commitment from the server. The server should respond with a positive acknowledgment, and commits the lease to the specific host. Ultimately, this lease will become active for a limited period of time, and the host can start to use it. If the host wants to continue with the use of same network configuration, the host must re-negotiate periodically a lease renewal with the DHCP server. Otherwise, the server will consider that this lease to be expired and the server may choose this lease to be assigned for another host as shown in Fig (1).
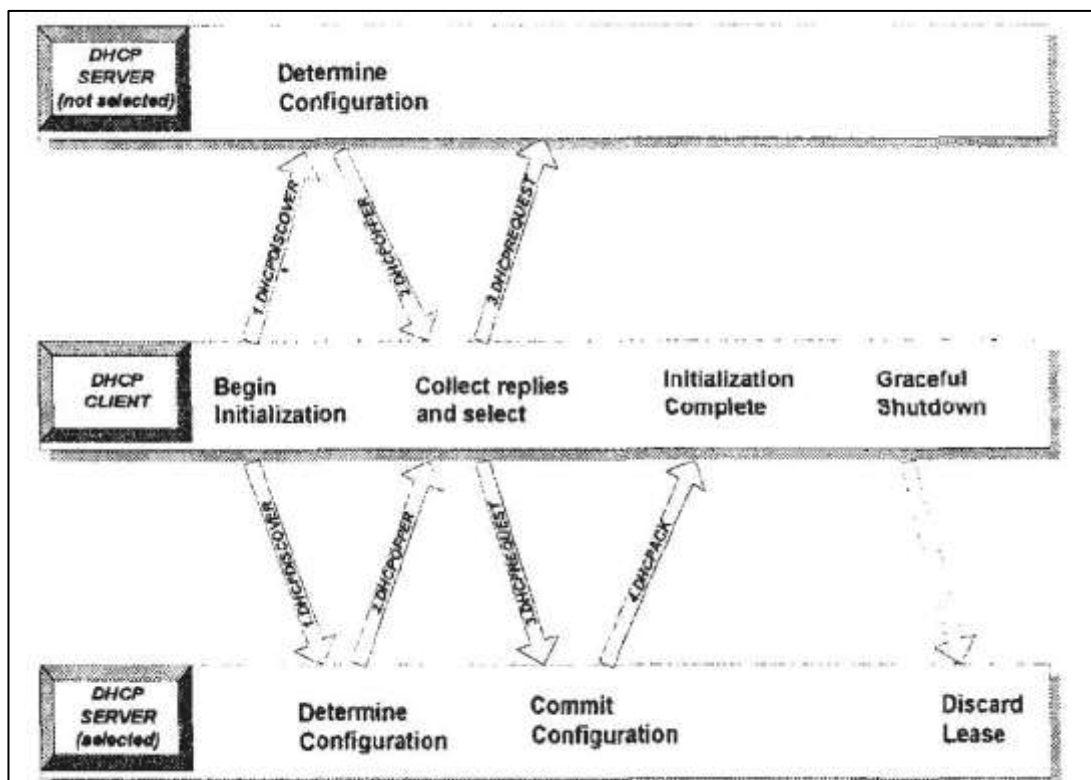

Fig (1): the process of the interaction between host and DHCP.

In order to ensure the absence of conflicting host configuration in the network, the DHCP server must check the rest of the existing hosts' configuration during the lease negotiation process. In case that the host is already configured the network parameters, the DHCP will not be able to guarantee that this host will be properly configured.

The DHCP view to the available IP addresses may not be accurate. As a trial to reduce the conflicting of address assignments, the server may employ a special technique which called "ping- before- offer" to the cause of verification to the available address before offering this address to specific host. Moreover, hosts upon receiving an address offer independently verify that the address is not already in use by sending a gratuitous ARP (Address Resolution Protocol). In case that the host detects that the offered address is already in use, a decline message is sent to the server. When the ping-before-offer test or a decline message reveals that an address is already in use, the server assumes that the IP address in question is no longer under its control and marks the corresponding lease as abandoned and typically it will not be offered to hosts for assignment (Brik, Stroik, & Banerjee, 2004).

In some situations, the host may try to ignore the specifications prepared by DHCP and breaks these specifications. This will lead to affect the network performance and result into a reduction of its efficiency.

For VLAN, the DHCP is required to overcome the problems associated with broadcast-packet bumping. In order to enhance the administration of DHCP for individual subnet, we have to use an agent server to request the DHCP to distribute the resources of the network configuration instead of direct providing of the DHCP configuration service (Dai & Chiang, 2007).

5.   HOW TO DEBUG THE DHCP?

In order to ensure that the DHCP will achieve its activities of addressing administration properly, the server of DHCP will depend on the hosts to follow the specifications that are prepared by the DHCP.

The increase of the use of the mobile hosts leads to make the networks to be more dynamic and impose us to concentrate more on the performance of DHCP, and also to investigate about how we can overcome the problems that may encounter the process of address administration of the DHCP (Brik, Stroik, & Banerjee, 2004). In order to do that, we will identify three main reasons that may cause the problems with the action of DHCP as follows:

The misconfigurations of the hosts: when the host is misbehaving, the usage of address may result into much inefficiency, and this will lead to arias both the address theft and usage of BOOTP.

The configurations of sub-optimal: the DHCP try to enable two necessary parameters to achieve its configuration. The first one is the range of dynamic address. The second one is the duration of the default lease and the typical time period for this duration. In order to make the choice of the previous parameters optimal, it will depend on different characteristics of the network access.

Access Control Lack: when the host tries to configure its parameters, it should use a broadcast first to explore the available servers of DHCP. At this time, the host does not have any mean to distinguish any server whether this server is authorized or not. Hence, the host may accept the wrong choice of network parameters and leads to prevent this host to access the network normally.

6.   DHCP & RHCP

In order to strength the regulation power of the DHCP, we have to make the DHCP hosts more manageable through enforce the DHCP to be integrated with some options such as DHCP-INFORM. In addition, we have to use a mechanism in which we can ensure the ability to force the inattentive hosts of DHCP to be corporate with administration of DHCP.

We have to send a Remote Host Configuration Protocol (RHCP) message to alert the host and inform this host to corporate. This is what called the DHCP/RHCP processing module. After this message, if the host insists on its decision in not to follow the DHCP policy and instructions, we have to detain and restrict the host network access right at bridges. By using this approach, we will be able to compensate the misuse of DHCP hosts and reduce the local conflict situations to its minimum rate (Wang & Lee, 2002).

7. CONCLUSION

The DHCP plays a flawless role in the environments which are controlled tightly, but the assignment of address in the relatively open environment becomes violated and inefficient. With the increasing of the complexity in the network, the process of configuration will be more difficult and it will involves errors and at the same time, and the administrator will not be able to recognize the violation in what concern to the address assignment.

ACKNOWLEDGEMENTS

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