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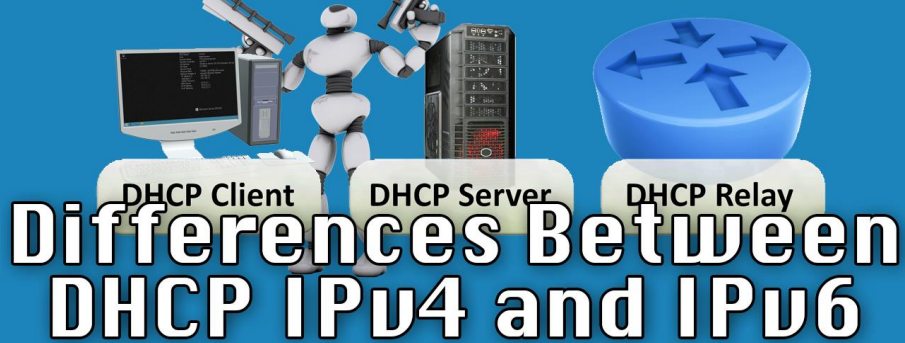## DHCP Client   DHCP Server   DHCP Relay

Differences Between DHCP IPv4 and IPv6

For the free video please see
http://itfreetraining.com/dhcp/ipv4_ipv6

Welcome to this video from ITFreeTraining on the differences between DHCP with IPv4 and IPv6. Despite performing the same function, DHCP in IPv6 is a little different from DHCP in IPv4.

Access the rest of the course: http://ITFreeTraining.com/dhcp
Download the PDF handout: http://ITFreeTraining.com/handouts/dhcp/ipv4_ipv6.pdf

Key Concepts

- Both protocols use DHCP Client/Relay/Server

DHCP Client   **DHCP Server**   **DHCP Relay**

0:18 – Before we review the differences, we'll first look at how the DHCP protocols have similar functionality in IPv4 and IPv6. There are three primary components to DHCP. There is the DHCP Client, DHCP Server and DHCP Relay. The components don't vary based on whether you are using IPv4 or IPv6. In later videos, we'll review these components individually and in more detail, but essentially each component works like this. The DHCP client will be a device on the network that is capable of utilizing the DHCP protocol to obtain network configuration information.

1:00 – A DHCP server is a component which provides the network configuration details to the DHCP clients. The DHCP server is configured by the network administrators with the proper network parameters set to meet their needs. The final component is the DHCP relay, more commonly referred to as the DHCP Relay Agent. When the DHCP client and DHCP server are on different networks that are separated by a router, the DHCP relay will pass the DHCP messages between the networks.

Scopes and Leases

1:35 – Next, we'll discuss DHCP scopes and leases. In later videos, we'll cover these concepts in more detail. DHCP for IPv4 and IPv6 both use these concepts. Basically, a scope is a collection of configuration information which will be used to provide configuration settings to devices on the network. A lease is a designation of how long the device on the network can use the provided information before having to request it again.

DORA and SARR

- Four messages used to configure a device

Discover message/Solicit message

Offer message/Advertise message

Request message/Request message

Acknowledgment message/Reply message

2:00 – The last similarity between DHCP for IPv4 and IPv6 is that they both use four messages to provide basic network configuration information to the devices on the network. In later videos, we'll dive deeper into how the messages are used to configure a device. The important point to take away from this is that, despite the names differing in IPv4 vs IPv6, the basic concept remains the same. Again, we'll discuss this more in later videos. We'll now review the differences between DHCP in IPv4 and IPv6.

Reservations

- Devices always get the same IP Address

IPv4

IPv6

MAC Address					
00	BB	FF	12	45	FA

IP Address

DUID	
IAID	IAID

IP Address

FAIL

2:35 – The first difference we'll review is "Reservations". We'll cover the reservations in much more detail in later videos, but essentially when a network administrator creates a reservation, a device on the network will be designated a certain IP Address to always use on the network. This is the same principle in both IPv4 and IPv6. In our example, we will use a desktop on the network. In the case of IPv4, the desktop has a network card. This network card has a MAC address. A MAC address is a unique number that is assigned to each and every network adapter, not unlike a serial number. The MAC address is involved with associating which IP Address to give the desktop.

3:20 – So essentially, what happens is that when a reservation is created in IPv4, the MAC address will be linked to an IP Address. When the DHCP server receives a request from that device and MAC address, the DHCP server will always assign that device the same IP Address. For basic networking, having IP Addresses allocated based on MAC address works really well. However, there's potential for issues to occur later on which IPv6 seeks to address.

3:48 – Let's review this same example within an IPv6 environment. The workstation will have a network card, like before. Unlike IPv4 however, rather than use the MAC address of the network card, the DUID and IAID are used. The DUID and IAID are essentially numbers and in later videos we'll explore the topic of their creation. For the purposes of our current discussion, we'll simply review what can be accomplished with utilizing these two numbers. By utilizing both the DUID and IAID, an IPv6 address can be allocated to the desktop. So, the process looks much the same as with IPv4. The difference is this. Let's suggest that the network card in the workstation was to fail.

4:28 – It is a rather simple matter to replace the existing network card with a new one. However, there is a complication as the new network card will have a new MAC address, a unique value that identifies the device on the network, but has now changed. In IPv6, the DUID would not change when a network card changes. However, the new network card is given a new IAID.

4:52 – Both in IPv4 and IPv6, the reservation would need to be updated; IPv4 with the new MAC address and IPv6 with the new IAID. Essentially with IPv6, there is now a way to determine and identify the device in the form of the DUID and the network interface in the form of an IAID. In subsequent videos, we'll review the creation of the DUID and IAID in more detail. For the moment, you should know that DHCP for IPv6 has a more sophisticated method for reservations than IPv4 which enables it to handle many more scenarios than IPv4.

Stateful and Stateless

- Two different methods of device configuration
- Stateful stores device configuration, stateless does not

Knows IP Addresses of all devices on the network.

Stateful

Stateless

Does not record IP Addresses used by devices. Uses Router Advertisements to distribute parameters.

5:30 – The next difference we'll examine is that IPv6 comes with both Stateful and Stateless configuration. This essentially means there are two different methods that can be used to configure a device within the network. At first, this may appear a bit confusing, but it is simply stating that stateful stores device configuration whereas stateless does not. Now we'll take a deeper dive and start by examining the 'Stateful' configuration. Consider that a server is setup on the network with DHCP installed. The primary point of the DHCP server is to automatically provide the network configuration data to devices on the network.

6:07 – If you use IPv4 with DHCP, it is considered a stateful implementation. If you use IPv6, you will have the option to choose stateful or stateless.

Broadcast and Multicast

- Broadcast goes to all nodes on the network
- Multicast goes to selected nodes
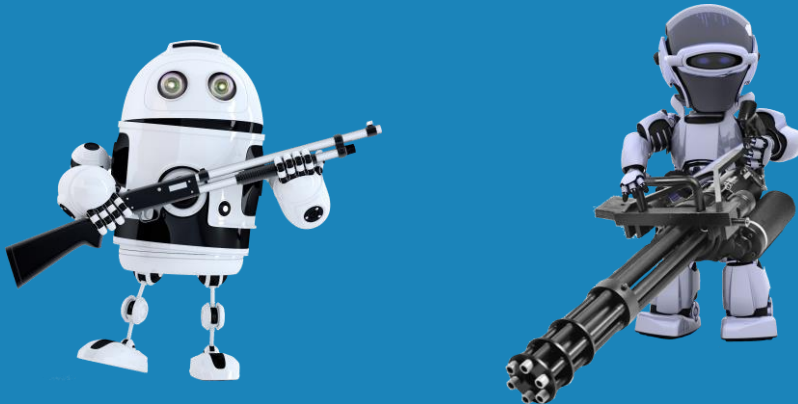
Broadcast will go to all nodes on the network. This is inefficient particularly on large networks as all nodes receive this information even if they do not require it. IPv4 uses broadcast/
Multicast allows packets to be targeted to particular nodes on the network. A node on the network can decided if it wants to be part of a multicast group. If the node joins that multicast group it will receive that multicast data.

See http://YouTube.com/ITFreeTraining or http://itfreetraining.com for our always free training videos. This is only one video from the many free courses available on YouTube.

References:
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https://tools.ietf.org/html/rfc3315

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