CNL_TEAM10 LAB3 結報

一IPv6:

解釋IPv6的Unicast、Multicast與Anycast並舉例說明

1.unicast:

Unicast is used when two network nodes need to talk to each other.It uses a one-to-one association between a sender and destination: each destination address uniquely

identifies a single receiver endpoint.

Example:HTTP

2.multicast:

Multicast uses a one-to-one association,that is,the sender transmit only one copy of data and it is delivered to many devices.It's something like IPv4 broadcast,but it can cross subnets and only nodes who join the multicast group receive the data.Because IPv6 don't have broadcast,there are multicast addresses for DHCPv6 like ff02::1:2(to all DHCP servers and relay agents on the local network site)

Example:SLP

3.anycast:

It is a one-to-one-of-many association where datagrams are routed to any single member of a group of potential receivers that are all identified by the same destination address. The routing algorithm selects the single receiver from the group based on which is the nearest according to some distance measure.

If we set a single unicast address to several devices in the internet,it will causes ip conflict,but anycast addressing allows multiple devices with the same anycast address(it is usually a server IP),if a client wants to talk to this server the router will route the datagram to the nearest one,usually to make load balance.

Example:6to4

解釋Router Solicitation與Router Advertisement的用途與功能

Router Advertisement and Router Solicitation messages enable a node on a link to discover the routers on the same link.Router Advertisement messages are sent periodically by a router to provide some following information to hosts:Router information such as link-layer address and lifetime of the prefix IPv6 prefixes for address autoconfiguration Network information such as MTU and hop limit Additional information such as reachable time, retransmission time for neighbor solicitations

For example:

1.If there's a host leaving,the router will send a router advertisement message(multicast) to inform neighbor routers and hosts there's a host leaving to let them update their routing table.

2.At system startup, a host on a link sends an router solicitation message to the all-routers multicast address (FF02::2).The router will reply a router advertisement message(unicast) immediately,that enables the host to configure its IPv6 address automatically, instead of having to wait for the next periodic RA message.

解釋何謂Stateful與Stateless address configuration。

Stateful autoconfiguration of IPv6 is the equivalent to the use of DHCP in IPv4. It requires a DHCPv6 service to provide the IPv6 address to the client device and that both client device and server maintain the "state" of that address .

IPv6 Stateless Address Autoconfiguration is described in RFC 2462,it Allows a host to create a global IPv6 address from:

– Its interface identifier (EUI-64 address)– Link Prefix (obtained via Router Advertisement)

Stateless address configuration is just the process mentioned above,When booting, the host asks for network

parameters:

– IPv6 prefix(es)

– default router address(es)

– hop limit

– (link local) MTU

A host's global address is a combination of link prefix and EUI-64 address

何謂DAD(Duplicate Address Detection)與其運作方式。

When an interface is initialized , it uses autoconfiguration to tentatively associate a link-local address with that interface. At this point, the interface joins the all-nodes and solicited-nodes multicast groups, and sends a neighbor discovery message to these groups. By using the multicast address, the node can determine whether that particular link-local address has been previously assigned, and choose an alternate address.

This eliminates accidentally assigning the same address to two different interfaces on the same link.

二、Mobile IPv6 (10%)

• MIPv6 如何解決Triangular Routing Problem?

Problem:

      If a fixed host wants to send data to a mobile host, since the fixed host don't know the IP address of the mobile host, the packet are first routed to the mobile host's home agent and then forwarded to the mobile host at its current location by its home agent. This cause problem:The route may not be the best.

    CH - Correspondent Host (The node mobile host is talking io)
    MH - Mobile Host
    HA - Home Agent
    FA - Foreign Agent
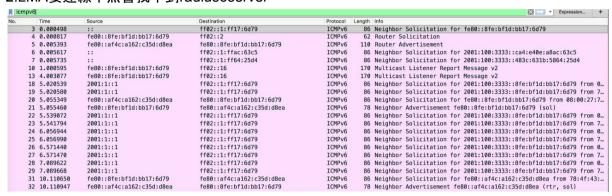
Solution in IPv6:

      When HA receives packets from CH, HA will tell CH the current FA address ,allow CH to establish tunnel and talk to FA directly. If the MH moves again, the new FA will transfer the updated binding information to the old FA to ensure that the packets are

transferred to the new FA. And meanwhile the HA gets the updated binding information so the subsequent packets will be transferred directly from the CH to the new FA.

實驗中遇到的難題與解決方法

1.投影片沒有提到要把MAG的第二張網卡改成192.168.13.1
2.LMA要連線不然會找不到radius6server

No.	Time	Source	Destination	Protocol	Length	Info
3	0.000498	::	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for fe80::8fe:bf1d:bb17:6d79
4	0.000817	fe80::8fe:bf1d:bb17:6d79	ff02::2	ICMPv6	62	Router Solicitation
5	0.005393	fe80::af4c:a162:c35d:d8ea	fe80::8fe:bf1d:bb17:6d79	ICMPv6	110	Router Advertisement
6	0.005617	::	ff02::1:ffac:63c5	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::ca4:e40e:a8ac:63c5
7	0.005735	::	ff02::1:ff64:25d4	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::483c:631b:5864:25d4
10	1.000595	fe80::8fe:bf1d:bb17:6d79	ff02::16	ICMPv6	170	Multicast Listener Report Message v2
13	4.003077	fe80::8fe:bf1d:bb17:6d79	ff02::16	ICMPv6	170	Multicast Listener Report Message v2
18	5.020539	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 0…
19	5.020580	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 7…
20	5.055349	fe80::af4c:a162:c35d:d8ea	fe80::8fe:bf1d:bb17:6d79	ICMPv6	86	Neighbor Solicitation for fe80::8fe:bf1d:bb17:6d79 from 08:00:27:7…
21	5.055460	fe80::8fe:bf1d:bb17:6d79	fe80::af4c:a162:c35d:d8ea	ICMPv6	78	Neighbor Advertisement fe80::8fe:bf1d:bb17:6d79 (sol)
22	5.539072	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 7…
23	5.541794	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 7…
24	6.056944	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 0…
25	6.056990	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 7…
26	6.571440	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 0…
27	6.571470	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 7…
28	7.089622	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 0…
29	7.089668	2001:1::1	ff02::1:ff17:6d79	ICMPv6	86	Neighbor Solicitation for 2001:100:3333::8fe:bf1d:bb17:6d79 from 7…
31	10.110650	fe80::8fe:bf1d:bb17:6d79	fe80::af4c:a162:c35d:d8ea	ICMPv6	86	Neighbor Solicitation for fe80::af4c:a162:c35d:d8ea from 78:4f:43:…
32	10.110947	fe80::af4c:a162:c35d:d8ea	fe80::8fe:bf1d:bb17:6d79	ICMPv6	78	Neighbor Advertisement fe80::af4c:a162:c35d:d8ea (rtr, sol)

實驗心得:

　　　莊東諺: 在編譯linux kernel的時候遇到了不少問題,像是記憶體空間或是磁碟空間不夠, 或是不明原因的無法開機. 花了最多的時間在這個上面, 希望以後的課程可以多一些網路的實作

　　　周宇霖 我的心得: 透過這次的課程與實驗，更加了解IPv6是什麼，以及和IPv4的不同的地方(如address變長、stateless auto-configuration等)、以及對mobile network所要面對的困難有初步認識。只是覺得實驗花稍多時間在處理硬體、環境設定等。

　　　尤沐惠 這次實驗很吃編譯時間，還有環境設定等等（需要好大的空間）基本上在老師講解課程與助教實驗講解後，對內容大致有更進一步的了解，不過因為花很多時間在處理硬體（還有等待），所以後來就開始花時間在想期末怎麼設計XD

　　　羅文斌 這一次的實驗前置步驟很多，要改很多設定檔，不過這一次的實驗講解算蠻清楚的，每一個步驟包括如何 compile kernel、IPv6 的設定、更改 ubuntu 16.04 的 en0 都有實際操作示範，比起實驗二清楚許多，實驗中設定變得比較順利。實驗本身的內容可能還是要先修過計網會比較清楚，對我來說，從實驗講解中來理解還是很有限。

　　　張君瑋:藉由這次實驗,更加了IPv6 mobile IP 的機制,但這次實驗編譯時間真的好長~

　　　周景軒 這次的實驗其實也很吃運氣，像我的Kernel編譯完後會莫名其妙無法開機，而我試了3-4次，平均一次編譯時間2-3小時，如果編譯後沒有問題，應該可以更快做完。

貢獻:

B01501085　莊東諺 1/6
B03902087　周景軒 1/6
B03902023　尤沐惠 1/6
B00401062　羅文斌 1/6

B01902051 張君瑋 1/6
B02501091 周宇霖 1/6