IPv6 SLAAC
Last Updated: 4/19/15

Before moving on - Concept needed for Lab4

A great example on how the eui-64 address is generated:
https://supportforums.cisco.com/document/100566/understanding-ipv6-eui-64-bit-address

What are the drawback of eui-64? Privacy. It uses the interface MAC address

What are:
  ● Duplicate Address Detection (DAD)
  ● Router Solicitation (RS)
  ● Router advertisement (RA)

Some important addresses to know
FE80::/10 Link Local (Unicast)

Neighbor Discovery Protocol - Multicast Addresses
  FF02::1 - all host
  FF02::2 - link-local

remember the naming convention
2001:0d02:0000:0000:0000:0014:0000:0095
= 2001:d02::14::95

You will be using all these key concepts to explain how SLAAC works

Commands on router:
<table>
<thead>
<tr>
<th>Command</th>
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</tr>
</thead>
<tbody>
<tr>
<td>ipv6 unicast-routing</td>
<td>debug ipv6 nd</td>
</tr>
<tr>
<td>ipv6 address xxxx::xxxx/y eui-64</td>
<td>show ipv6 interface brief</td>
</tr>
<tr>
<td>ipv6 address autoconfig</td>
<td>show ipv6 interface f0/0</td>
</tr>
</tbody>
</table>

Commands on VPCs
<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip auto</td>
</tr>
<tr>
<td>show ipv6</td>
</tr>
</tbody>
</table>

Commands on PC
<table>
<thead>
<tr>
<th>Command</th>
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</tr>
</thead>
<tbody>
<tr>
<td>route -A inet6 add ::/0 gw aabb::1</td>
<td>route -A inet6</td>
</tr>
<tr>
<td></td>
<td>service network restart</td>
</tr>
<tr>
<td>sysctl -w net.ipv6.conf.all.forwarding=1</td>
<td>sysctl -w net.ipv6.conf.default.forwarding=1</td>
</tr>
<tr>
<td>sysctl net.ipv6.conf.all.use_tempaddr=2</td>
<td>sysctl</td>
</tr>
</tbody>
</table>
In this lab we are going to configure the network devices using IPv6 address. The goal is to understand how SLAAC works.

**PART 1: Routers**

**Start capture on f0/0 R2**

<table>
<thead>
<tr>
<th>Router 1</th>
<th>Router 2</th>
</tr>
</thead>
</table>
| configure terminal  
ipv6 unicast-routing  
interface fa0/0  
ipv6 address 2000:1111:AAAA::/64 eui-64  
no shut  
exit | configure terminal  
ipv6 unicast-routing  
interface fa0/0  
ipv6 address autoconfig  |
| **//static route**  
ipv6 route 2000:2222:bbbb::/64  
2000:1111:aaa:0:a00:27ff:fec4:88af | no shut  
interface fa1/0  
ipv6 address 2000:2222:BBBB::/64 eui-64  
no shut  
end |

**Discussion:**

eui-64 vs autoconfig?

In router 2 (fa0/0), it does not have any router to ask for a network prefix. The command used in the configuration gives it a network prefix and tells it to use that prefix to configure its own address using eui-64. Since router 1 (fa1/0) can ask router 2 for a prefix all it needs to do is use that information to configure its address.

Based on router 2’s address, does autoconfiguration use the eui-64?
Notice packets with source :: were sent to each of host’s addresses twice, once to link local and once global unicast address. What are these packets?

<table>
<thead>
<tr>
<th>Source</th>
<th>Destination</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>::</td>
<td>ff02::1:ffcf:0</td>
<td>ICMPv6</td>
</tr>
<tr>
<td>fe80::cc01:6fff:fecc:0</td>
<td>ff02::1</td>
<td>ICMPv6</td>
</tr>
</tbody>
</table>

**Check connectivity:**
R2: show ipv6 interface brief
R1: ping <R2’s address>

**VPC**
ip auto

Note: VPCs will not have a route to R1 until it receives its first Ping from R1.

**PART 2: Linux Hosts**

![Network Diagram]

**Router 1**

```
configure terminal
ipv6 unicast-routing
interface fa0/0
ipv6 address 2000:1111:AAAA::/64 eui-64
no shut
exit
end
```
Turn on IPv6

//If your interface is attached to a configure router with (RA), this is enough
to have get an address assignment

vi /etc/sysconfig/network

#change
NETWORKING_IPV6=yes
#append
IPV6_AUTOCONF=yes

service network restart
ifconfig eth0 up

ifconfig eth1 up

//static ip assignment
ifconfig eth1 inet6 add 2000:2222:bbbb:0::123/64

//enable ipv6 forwarding
sysctl -w net.ipv6.conf.all.forwarding=1
sysctl -w net.ipv6.conf.default.forwarding=1

//Now we are going to make PC1 pretend to be a router
vi /etc/radvd.conf

//Uncomment and change prefix

interface eth1
{
    AdvSendAdvert on;
    MinRtrAdvInterval 30;
    MaxRtrAdvInterval 100;
}
prefix 2000:2222:bbbb::/64
{
    AdvOnLink on;
    AdvAutonomous on;
    AdvRouterAddr on;
};
};

// start router announcement daemon on eth1
/etc/init.d/radvd start

PC2

Turn on IPv6

vi /etc/sysconfig/network

# change
NETWORKING_IPV6=yes
# append
IPV6_AUTOCONF=yes

service network restart
ifconfig eth0 up

// add route from PC1 to VPCS1
route -A inet6 add 2000:1111:aaaa::/64 gw 2000:2222:bbbb:0::123

PC2: ping6 -c3 <router 3 address>

Discussion:
What do we see in the wireshark activities? What information is in the RA?
### Turn on Privacy address

#### PC2

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><code>sysctl net.ipv6.conf.all.use_tempaddr=2</code></td>
</tr>
<tr>
<td><code>sysctl net.ipv6.conf.default.use_tempaddr=2</code></td>
</tr>
<tr>
<td><code>service network restart</code></td>
</tr>
<tr>
<td><code>ifconfig eth0 up</code></td>
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#### PC2: ping6 -c3 <router 3 address>

**Discussion:** Any changes in ping packets?

### RESTORE CONFIG FILES!!!!

#### PC1

<table>
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<tr>
<td><code>cp /etc/sysconfig/network.ORIG /etc/sysconfig/network</code></td>
</tr>
<tr>
<td><code>cp /etc/rdadv.conf.ORG /etc/rdadv.conf</code></td>
</tr>
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#### PC2

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