ROLLING OUT IPV6

Dennis Burgess

ROLLING OUT IPV6

- **Getting your IPv6 Prefix**
- **Setup BGP with v6**
  - Announcing your v6 prefix
  - Filters
- **Subnetting v6**
  - How ARIN suggests you do it
  - How I suggest you do it!
- **OSPFv3**
  - Setting up
  - Routing traffic
- **IPv6 Address Configurations**
  - Assign v6 Prefixes
  - DHCPv6
  - PPPoE and v6 Prefixes

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- **Author of "Learn RouterOS"**
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  - MikroTik, Cambium, Mimosa, Baicells
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  - www.linktechs.net

GETTING STARTED

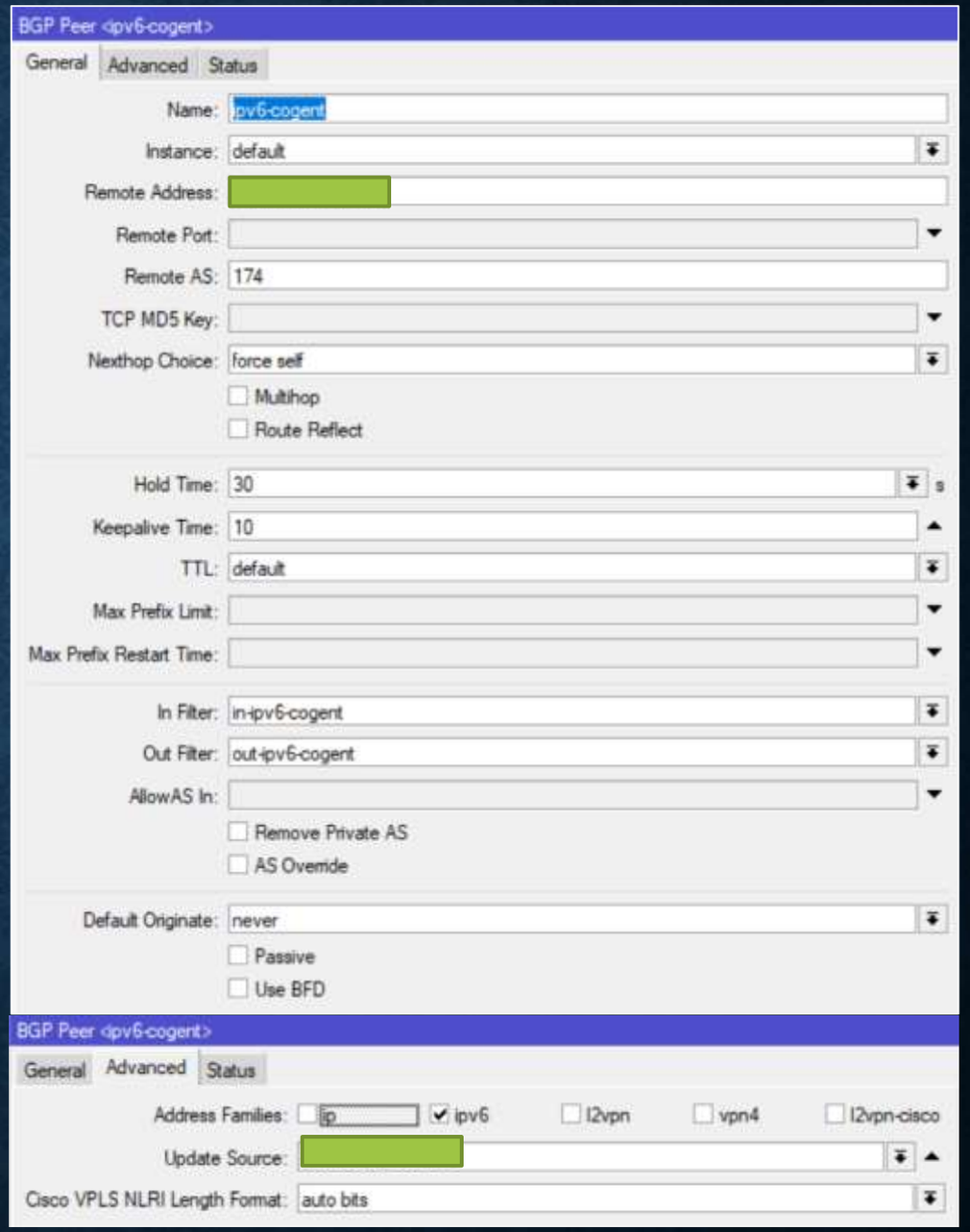
- **Get your /32-/36 From ARIN**
  - Contact ARIN, www.arin.net
  - Assumes you have v4 resources from ARIN
  - Request your v6 block
  - Pay for it
  - Get your v6 block!

GETTING STARTED

- **Get your /32-/36 From ARIN**
  - Contact ARIN, www.arin.net
  - Assumes you have v4 resources from ARIN
  - Request your v6 block
  - Pay for it
    - You will pay $500 per year for a /32-/36
  - Get your v6 block!

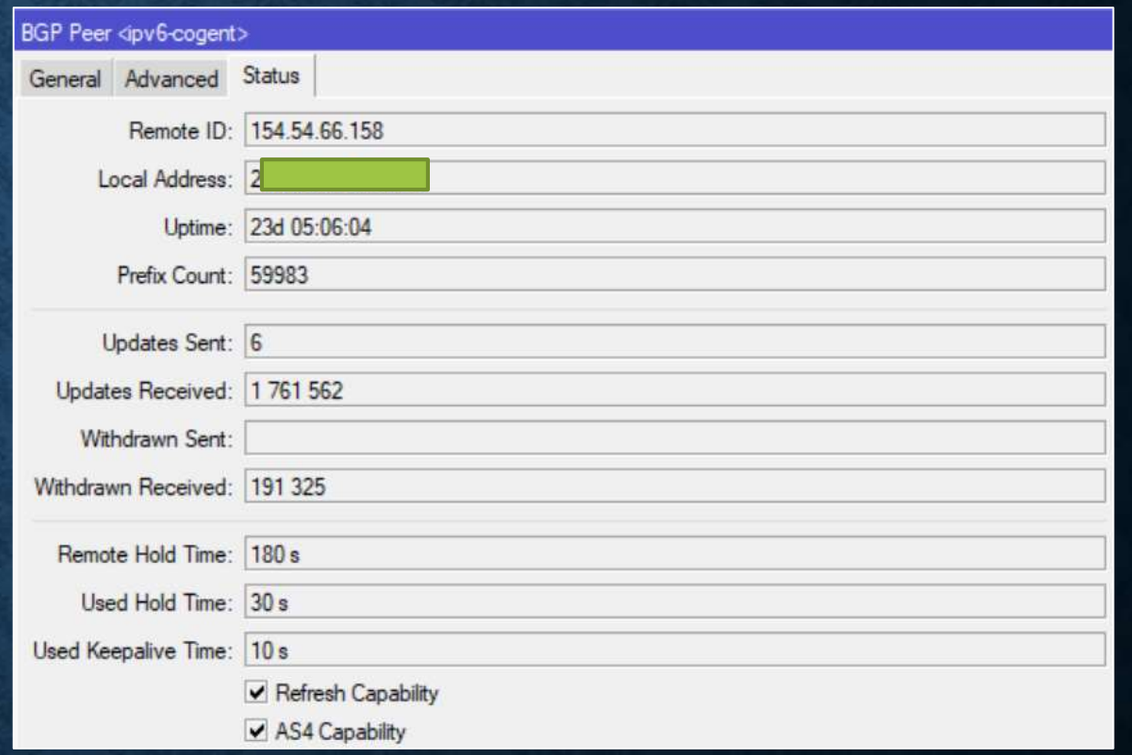
BGP WITH IPV6

- **Same as BGP with IPv4**
  - IPv6 addresses instead of v4 addresses
  - Address family will be IPv6 vs IPv4
    - **BGP Best Practices**
      - Be sure to configure in-out filters
      - Specify the source IP
      - Change the hold/Keepalive Times



BGP WITH IPV6

- **Same as BGP with IPv4**
  - **BGP Peer Established**
    - Add a IP from your prefix on your router
    - Verify you can get to google, Netflix, towercoverage.com etc.
    - Drop a /64 on an interface and make sure you can surf with IPv6



SUBNETTING

- **Minimum Prefix Size = /64**
  - This is the min size for stateless autoconfiguration to work.
  - Therefore the minimum prefix that you should give customers is /64.
    - Note: this is without DHCP, with DHCP you can go much smaller, but 99% of the installations I have done has not used DHCPv6 to assign IPs on local LANs, they simply use the SLACC (autoconfigure)
  - **I DO NOT RECOMMEND GIVING THEM THE MINIMUM ALLOCATION REQUIRED.**

SUBNETTING

- **ARINs Recommended Subnetting**
  - /48 to every customer
    - This simply can be a larger pool of IPv6 addresses that you put in your DHCPv6 server, then issue /48 Prefixes to each customer.
    - They wish to assign the first three hex numbers as the customer, something they would be able to remember.
    - Think: 2442:A300:AAAA::/48 that's it.
      - That gives each Subscriber: 65,536 potential LAN segments

SUBNETTING

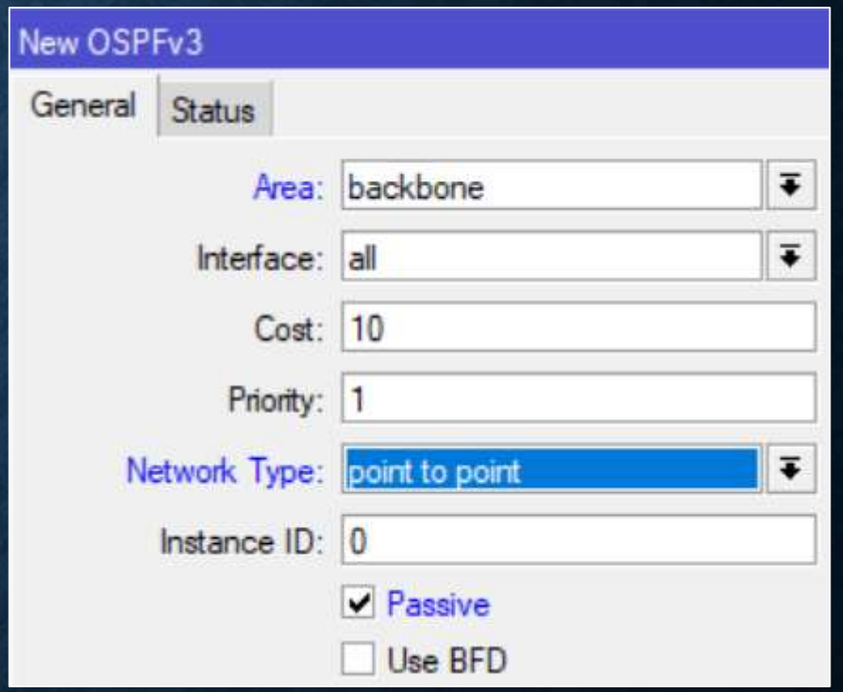
- **ARINs Recommended Subnetting**
  - Note that there are plenty of other resources on how to subnet
- **Another registry states /48s to /56s are fine.**

SUBNETTING

- **My Recommended Subnetting**
  - /56-/60 to every customer
    - Yes this is much smaller
    - /60 gives 16 x /64s
    - /56 gives 256 x /64s
    - **<u>IT IS UP TO YOU</u>**
  - How many LAN segments do you think the average home needs?
  - You can always router a /48 to businesses if they request it? Or even a home!

OSPFV3

- **Setting up OSPFv3**
  - No more Networks to worry about.
  - **Just add the interfaces**
  - By Default ALL interface should be passive
    - Best Practice
  - Still need to setup your routerID
    - Can be the same as IPv4 OSPF RouterID!!



OSPFV3

- **Setting up OSPFv3**
  - That's it! SUPER SIMPLE
    - OSPFv3 forms relationships via the FE80 (link-local) Address
    - You can assign /126s if you wish, but its not a requirement.

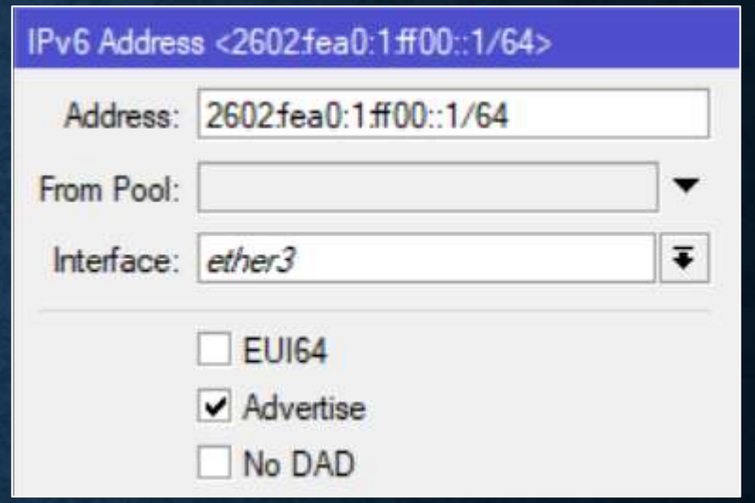
Instance	Area	Router ID	Gateway
default	backbone	10.188.1...	fe80::e68d:8cff:fe19:...
default	backbone	10.251.3.1	
default	backbone	10.251.0...	fe80::260:e0ff:fe55:9...
default	backbone	10.188.1...	fe80::e68d:8cff:fe19:...
default	backbone	10.188.1...	fe80::e68d:8cff:fe19:...
default	backbone	10.251.2...	fe80::e68d:8cff:fe19:...
default	backbone	139.60.2...	fe80::e68d:8cff:fe19:...
default	backbone	10.222.1...	fe80::e68d:8cff:fe19:...
default	backbone	10.50.1.17	fe80::e68d:8cff:fe19:...
default	backbone	10.188.1...	fe80::e68d:8cff:fe19:...
default	backbone	10.188.1...	fe80::260:e0ff:fe55:9...
default	backbone	10.50.1.50	fe80::e68d:8cff:fe19:...
default	backbone	10.188.1...	fe80::e68d:8cff:fe19:...

IPV6 ADDRESS CONFIGURATIONS

- **SLACC (Auto-config)**
- **DHCPv6**
- **PPPoE**
- **CPE Configuration**
  - Routed CPE + Customer Router

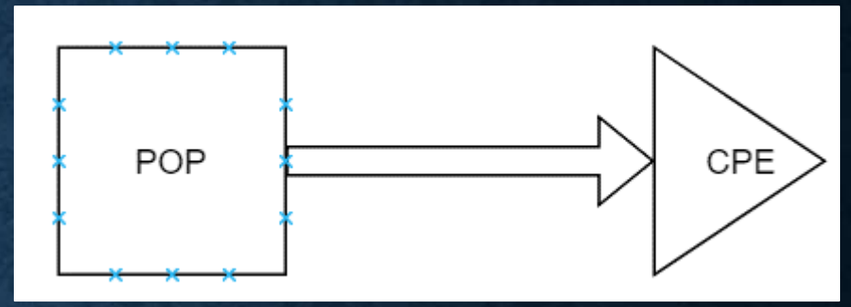
IPV6 ADDRESS CONFIGURATIONS

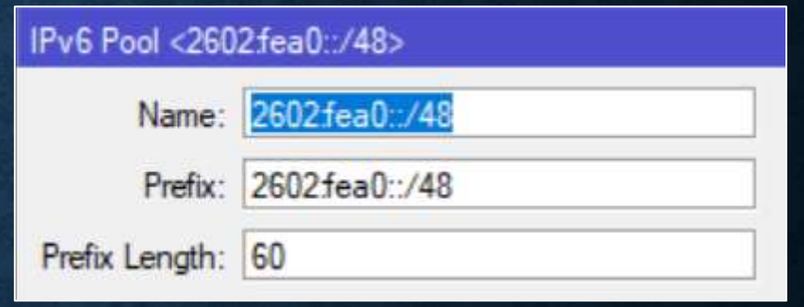
- **SLACC (Auto-config)**
  - Assign a /64 with a IP on it.
  - Check the advertise option
  - This tells this server it is advertising this prefix out to other IPv6 Clients
  - Clients with IPv6 enabled will then request a prefix, this router will respond with the prefix and the SLACC autoconfigure will occur.

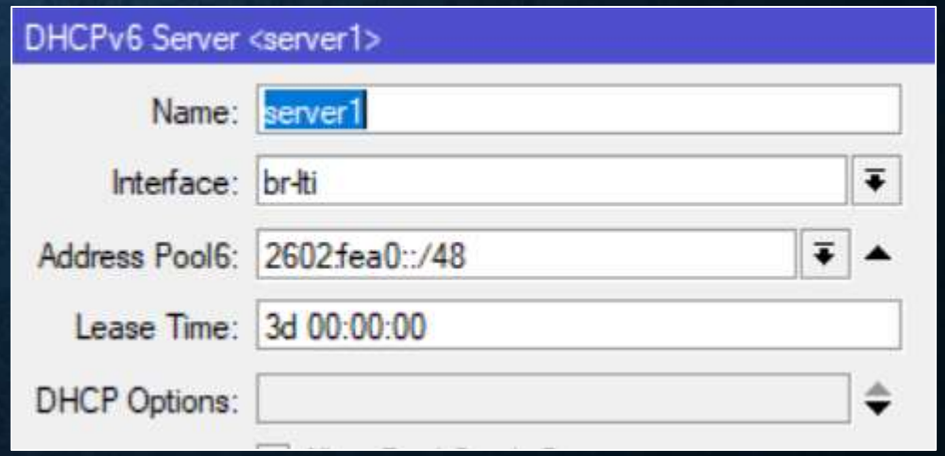


IPV6 ADDRESS CONFIGURATIONS

- **DHCPv6 – POP Location**
  - Create a IPv6 Pool
    - We created a pool with a /56, but the prefix we will hand out is a /60
  - Create IPv6 DHCPv6 Server
    - Specify what interface, options as well as lease time and IPv6 Pool

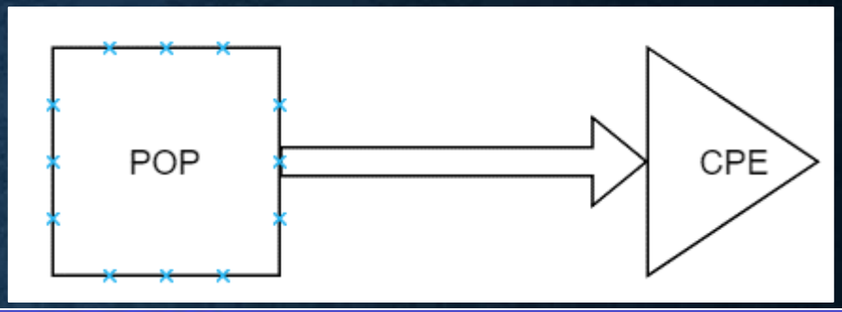


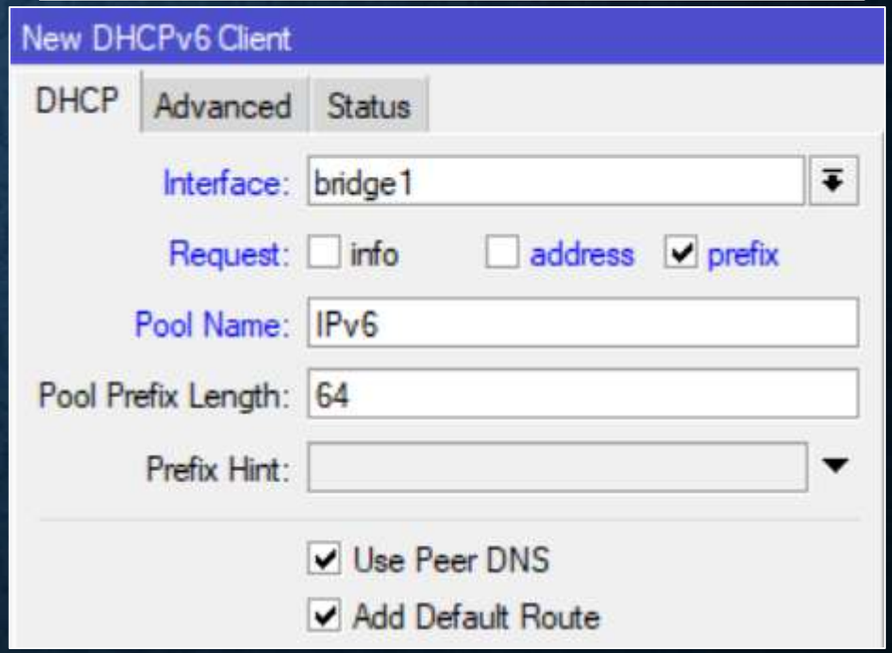




IPV6 ADDRESS CONFIGURATIONS

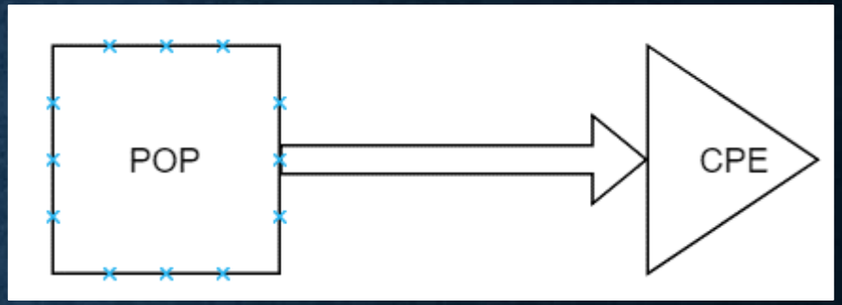
- **Examples**
  - POP location - /48
  - CPE - /60
    - DHCPv6 Server n POP Location
    - DHCPv6 Client on CPE
      - Add IPv6 Pool
      - Select Prefix
      - Place on Upstream Interface

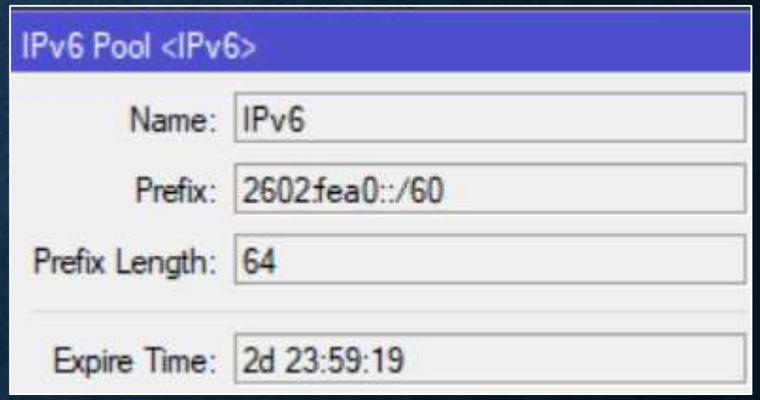




IPV6 ADDRESS CONFIGURATIONS

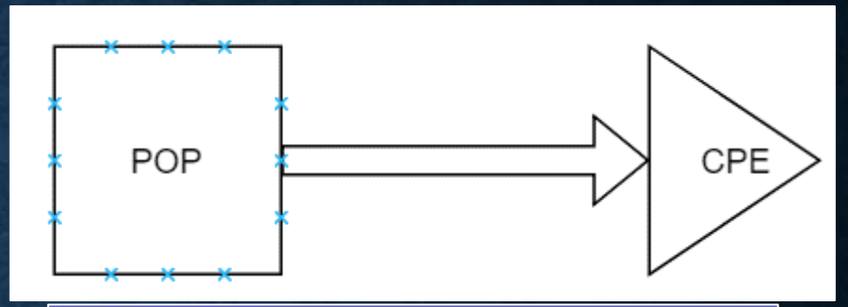
- **Examples**
  - POP location - /48
  - CPE - /60
    - This creates the IPv6 Pool

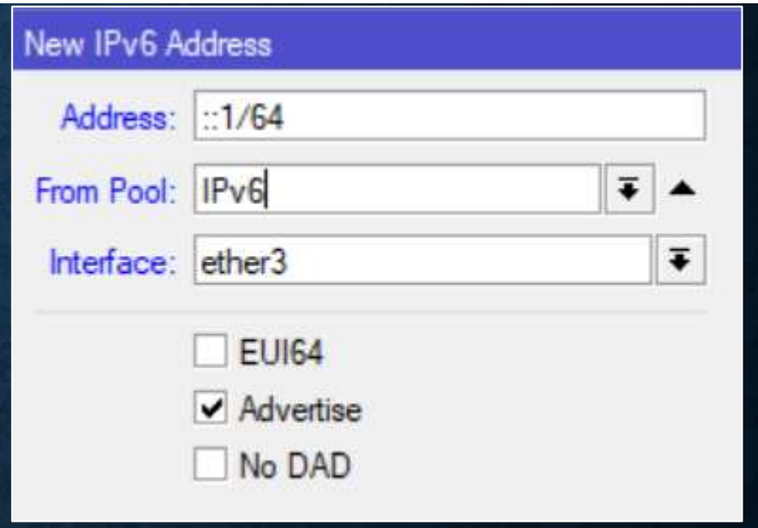




IPV6 ADDRESS CONFIGURATIONS

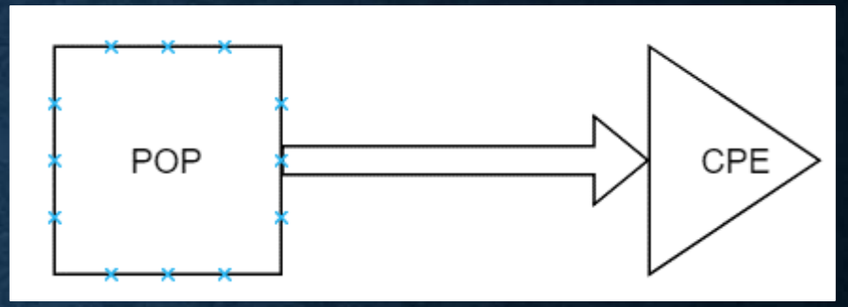
- **Examples**
  - POP location - /48
  - CPE - /60
    - DHCPv6 Client on CPE
      - Add IPv6 Address from Pool
      - Place on Interface





IPV6 ADDRESS CONFIGURATIONS

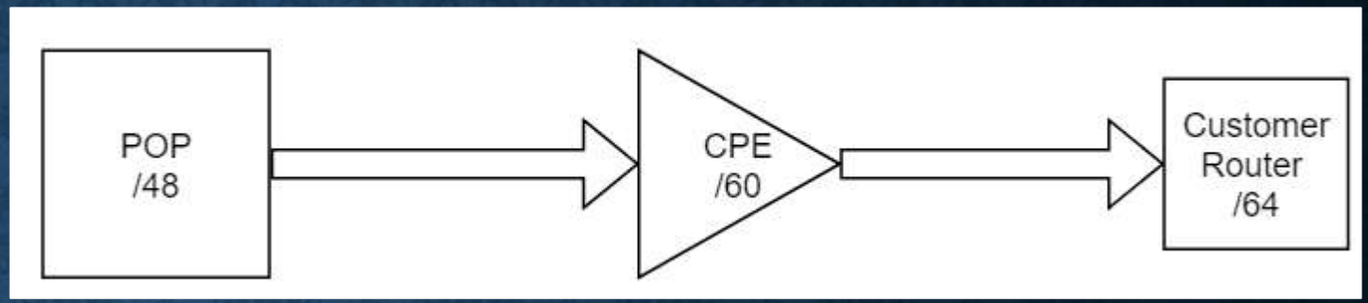
- **Examples**
  - POP location - /48
  - CPE - /60
    - Lets say we want to create a Guest network.
      - We use another interface and put in the ::1/64 and it will auto assign.



	Address	From Pool	Interface
G	2602:fea0::1/64	IPv6	ether4
G	2602:fea0:0:1::1/64	IPv6	ether3
G	2602:fea0:0:2::1/64	IPv6	bridge1

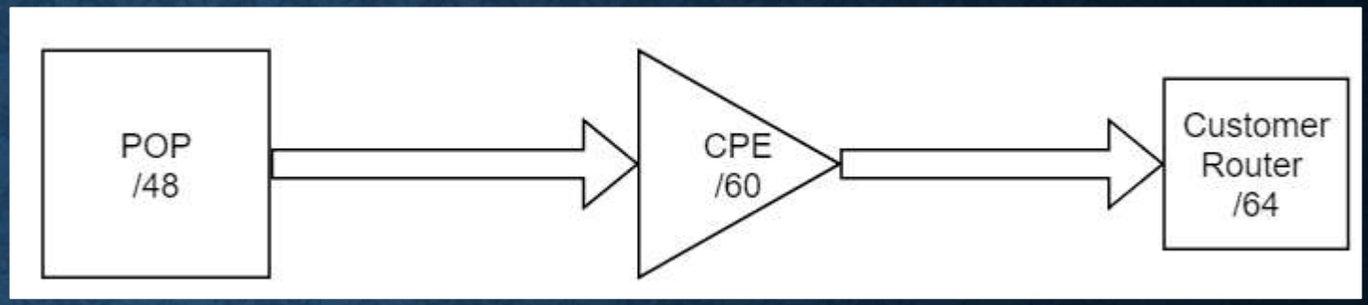
IPV6 ADDRESS CONFIGURATIONS

- **Examples**
  - POP location - /48
  - CPE - /60
  - Customer Router - /64



IPV6 ADDRESS CONFIGURATIONS

- **Examples**
  - POP location - /48
  - CPE - /60
    - Setup the CPE the same as the previous example
    - We commonly place a /64 on the CPE LAN interface but we also turn on DHCPv6
    - This enables us to hand a /64 to the customer router
    - Does not help with guest networks etc
    - Does offer v6 Prefix to requesting devices
  - Customer Router - /64



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