

## Lab - Guideline

### Topics

- A. IPv6 – Intro
- B. IPv6 – Static routing

### A. Commands – routing table

*Netstat and route commands*

```
netstat -r  
route print
```

*Netsh commands*

```
netsh>  
    interface ipv6  
    interface ipv6 show ...  
    interface ipv6 add address ...  
    interface ipv6 add route ...  
    interface ipv6 add dnsserver ...
```

Examples: <http://computernetworkingnotes.com/ipv6-features-concepts-and-configurations/ipv6-address.html>

IPv6 has 128-bit source and destination addresses



*IPv6 header*

An IPv6 address is formed by two entities: prefix and interface id

Prefix	Interface ID
3FFE:0301:DEC1::	0A00:2BFF:FE36:701E

### IPv6 Addressing methods:

- Unicast: one to one,
- Multicast: one to many (to a group)
- Anycast: one to nearest interface (from a group)

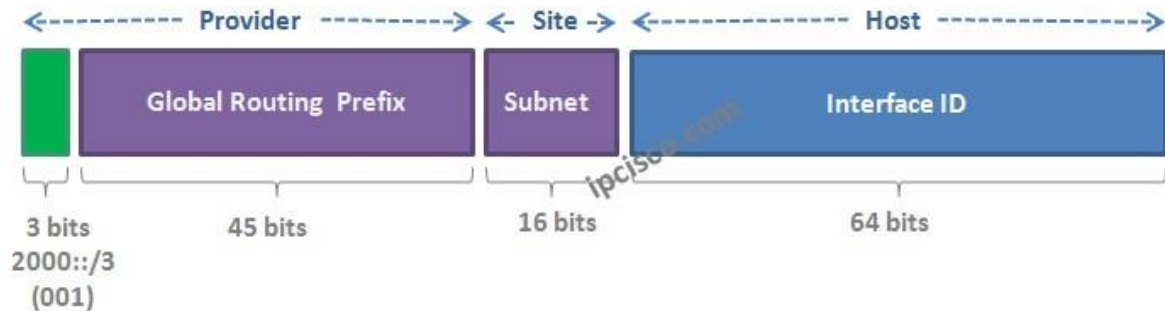
## IPv6 Addresses:

### Unicast Addresses

- global

0	47	48	63	64	127
global routing prefix			subnet ID		interface ID

### Global Unicast IPv6 Address



Example: 2a03:2880:f123:83:face:b00c:0:25de

- private
  - o Link local (for a link, used for address configuration, neighbor discovery):
    - starts with FE80::/10 - FEB0::/10 prefix

Example: fe80::c891:e16d:b55:7253

- o Site local (for an organization):
  - starts with FEC0::/10 - FEF0::/10 prefix – where deprecated
- o unique local addresses (use in private IPv6 networks):
  - address block fc00::/7

Example: fde4:8dba:82e1::ea34::71ff:fe0

### Adresele Multicast

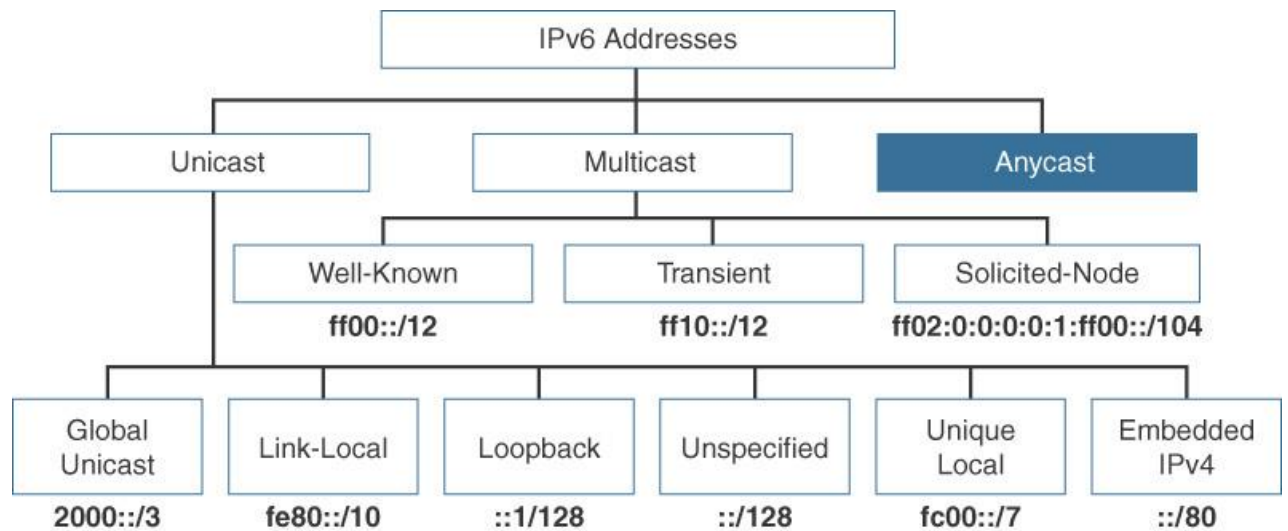
0	7	8	11	12	15	16	127
Indicator (FF)		Flags 000T (transient flag)		Scope ID		Group ID	
FF		IF T =0 well known multicast (permanent) IF T =1 transient		node-local=1, link-local=2, site-local=5, organization-local=8, global=14			

- Well-known Multicast Groups
  - o solicited-node
  - o all nodes
  - o all routers

Example: FF02::1:FF55:7253

### Anycast Addresses

- “send to any one member of this group”



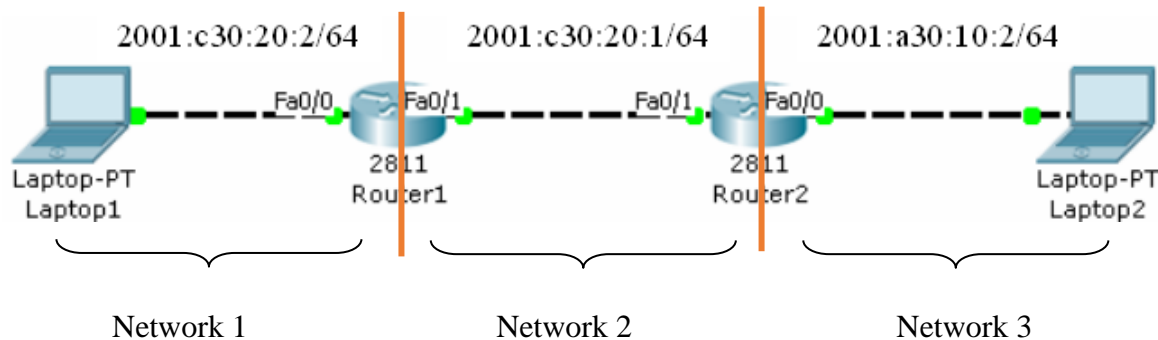
(from www.ciscopress.com)

### ***Global addresses auto-configuration***

- Stateless – **router**
  - Link-Local Address Generation
  - Link-Local Address Uniqueness Test: sends a Neighbor Solicitation message using the Neighbor Discovery (ND) protocol to check if it is unique
  - Link-Local Address Assignment
  - Router Contact
    - listening for Router Advertisement messages sent periodically by routers or
    - by sending a specific Router Solicitation to ask a router for information
  - Global Address Configuration
  -
- Statefull - **DHCPv6**
  - Using DHCPv6 protocol by deploying a DHCPv6 server in the network

## B. IPv6 – static routing

Laboratory test configuration:



**Step0:** Enter configuration mode and configure ipv6 unicast routing (enables the forwarding of IPv6 unicast datagrams)

```
Router>enable
Router#configure terminal
Router(config)# ipv6 unicast-routing
```

**Step1:** Assign static IPv6 addresses to router interfaces and computers

General syntax:

```
Router(config-if)#ipv6 address ipv6-address/prefix-length [eui-64]
```

Example:

**Recommended method** (manually specifying the Prefix and the *eui-64* option will assign automatically an InterfaceId):

```
Router1(config)#interface fastEthernet 0/0
Router1(config-if)#ipv6 address 2001:C30:20:2::/64 eui-64
Router1(config-if)#no shutdown
```

**or** (not recommended, unless you have a specific IPv6 address)

```
Router1(config)#interface fastEthernet 0/0
Router1(config-if)#ipv6 address 2001:C30:20:2:209:7CFF:FE4D:1501/64
Router1(config-if)#no shutdown
```

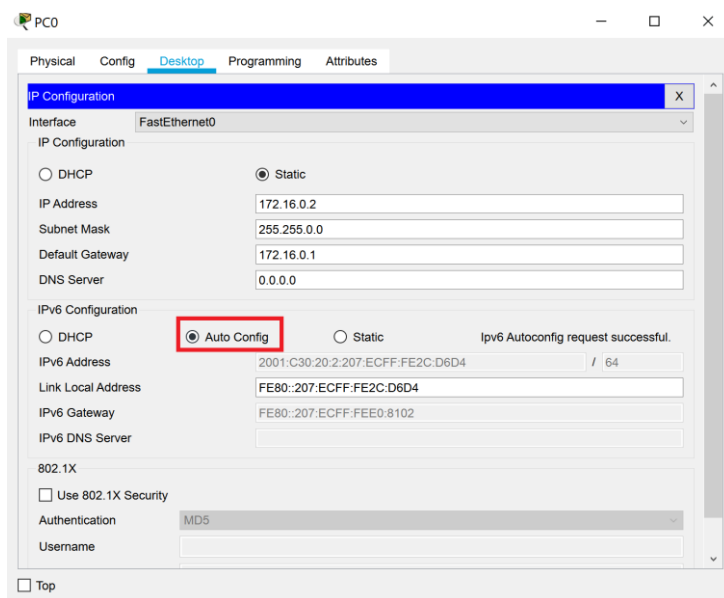
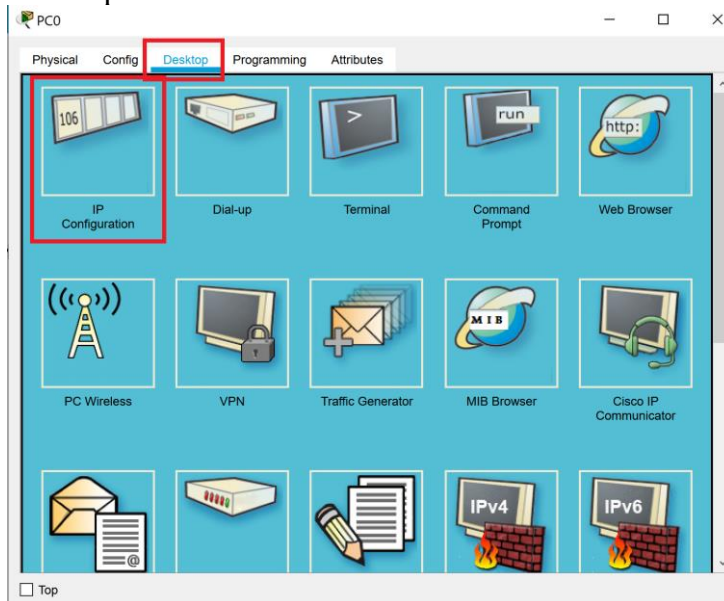
**Step1a:** Show IPv6 address of the interface fastEthernet 0/0

```
Router(config-if)#end
Router#show ipv6 interface fastEthernet 0/0
```

**Step 1b:** configure all the others interfaces on the routers with IPv6 addresses

## Step2: Configure IPv6 addresses for the PCs

- On the PCs select the Auto-configuration option (stateless configuration) – see pictures below



### Step3: Set static routes

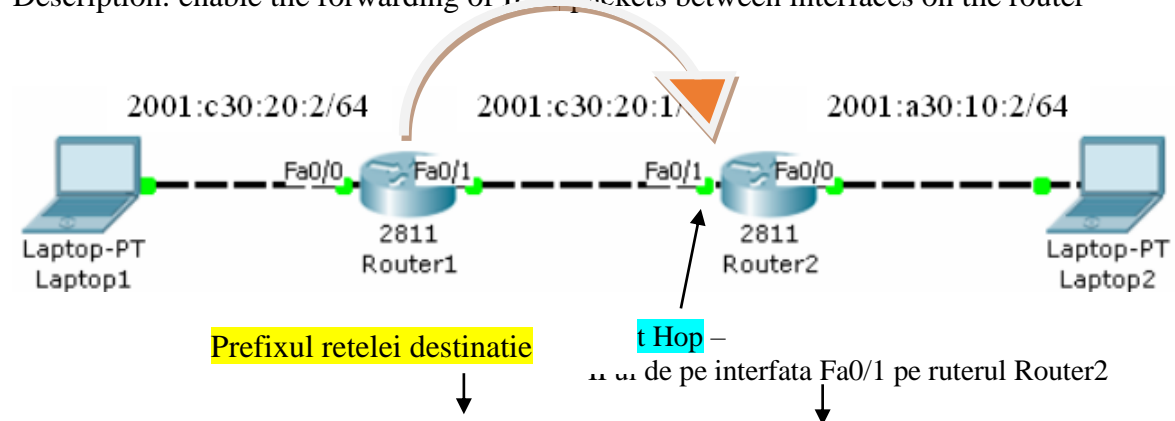
General syntax:

```
Router(config)#ipv6 route ipv6-prefix/prefix-length next_hop_ipv6  
address/interface
```

Example:

#### ***Router(config)#ipv6 unicast-routing***

Description: enable the forwarding of IPv6 packets between interfaces on the router



```
Router1(config)# ipv6 route 2001:A30:10:2::/64 2001:C30:20:1:290:2BFF:FE71:6702
```

Description: configure a static route to 2001:A30:10:2::/64 network

#### ***Router#show ipv6 route***

Description: Visualize the routing table

**Repeat step 3 for Router2 also, using the correct prefix and next-hop address**

Test the connectivity.

- *ping <target IP>*
- *tracert <target IP>*