



القيادة أكاديمي



القيادة القابضة



# سيسكو في 6 ساعات

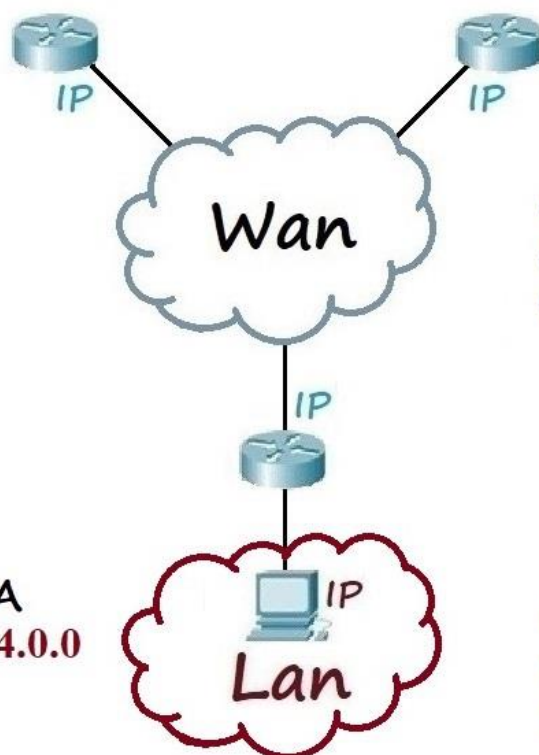


الكورس

يختصر أكثر من مائة ساعة  
يركز على احتياجات المهندسين  
في سوق العمل

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Second Edition  
حقوق النشر والترجمة محفوظة

- IPv4



APIPA  
169.254.0.0

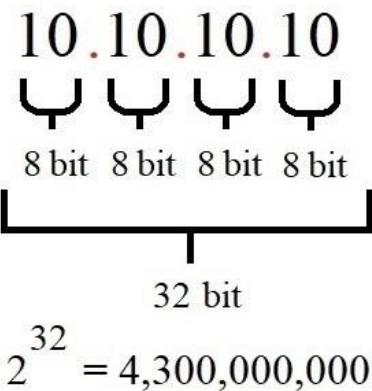
**Public IP**

Class A	1.X.X.X - 126.X.X.X	255.0.0.0
Class B	128.X.X.X - 191.X.X.X	255.255.0.0
Class C	192.X.X.X - 223.X.X.X	255.255.255.0

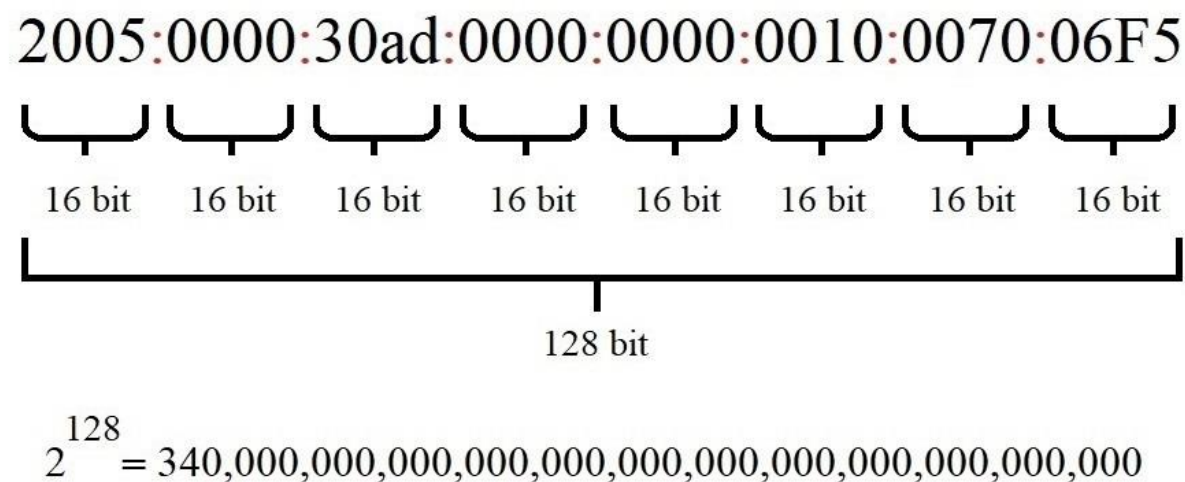
**Private IP**

Class A	10.X.X.X - 10.X.X.X	255.0.0.0
Class B	172.16.X.X - 172.31.X.X	255.255.0.0
Class C	192.168.0.X - 192.168.255.X	255.255.255.0

- IPv4



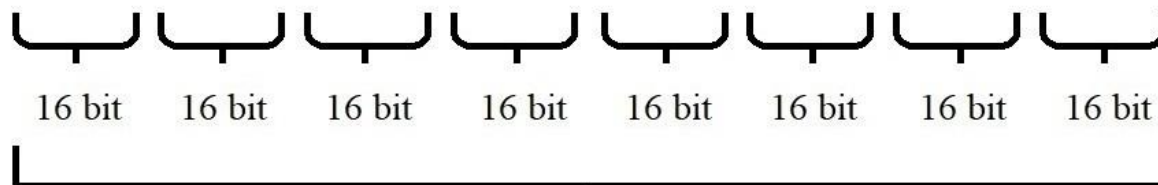
- IPv6



0010000000000101 : 0000000000000000 : 0011000010101101 : 0000000000000000 : 0000000000000000 : 0000000000010000 : 0000000001110000 : 0000011011110101

- IPv6

2005:0000:30ad:0000:0000:0010:0070:06F5

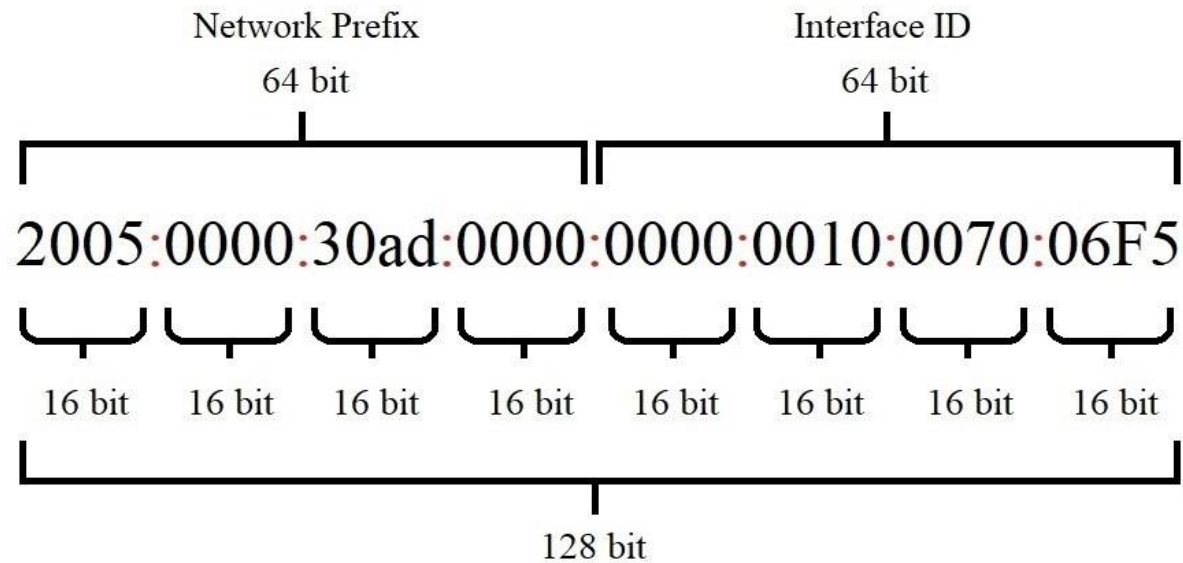


128 bit

$$2^{128} = 340,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000$$

Hex	Binary	Dec
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
A	1010	10
B	1011	11
C	1100	12
D	1101	13
E	1110	14
F	1111	15

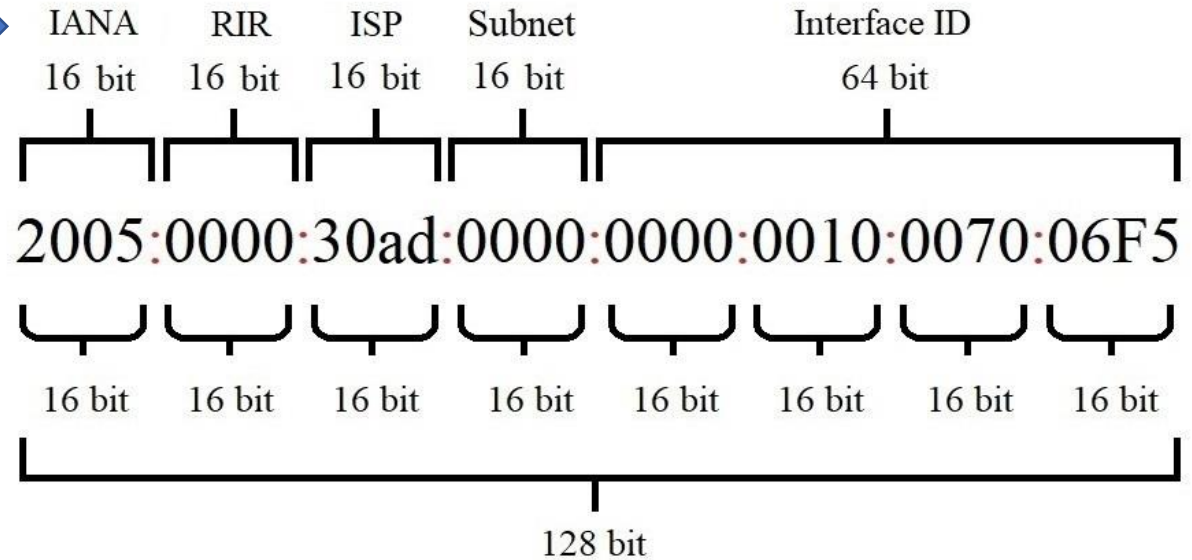
- IPv6



$$2^{128} = 340,000,000,000,000,000,000,000,000,000,000,000,000,000,000$$

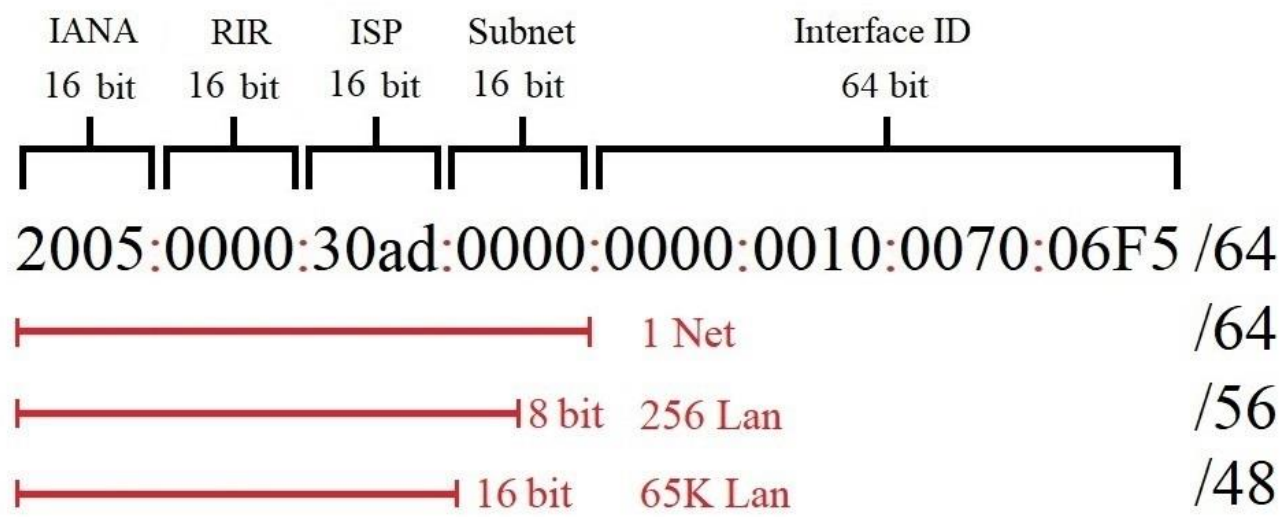


- IPv6



$$2^{128} = 340,000,000,000,000,000,000,000,000,000,000,000$$





- IPv6

- IPv6

IPv6 rules

2005:0000:30ad:0000:0000:0010:0070:06F5

2005:0000:30ad::0010:0070:06F5

2005:0:30ad::10:70:6F5



## - IPv6

### IPv6 rules

0000:0000:0000:0000:0000:0000:0000:0000



::

0000:0000:0000:0000:0000:0000:0000:0001



::1

- IPv6

- IANA

X : X : X : X : X : X : X : X



Unicast	2000::/3
	FE80::/10
	FC00::/7
Multicast	FF00::/8
	FF02::1:FF
Anycast	Same IP

Global Unicast

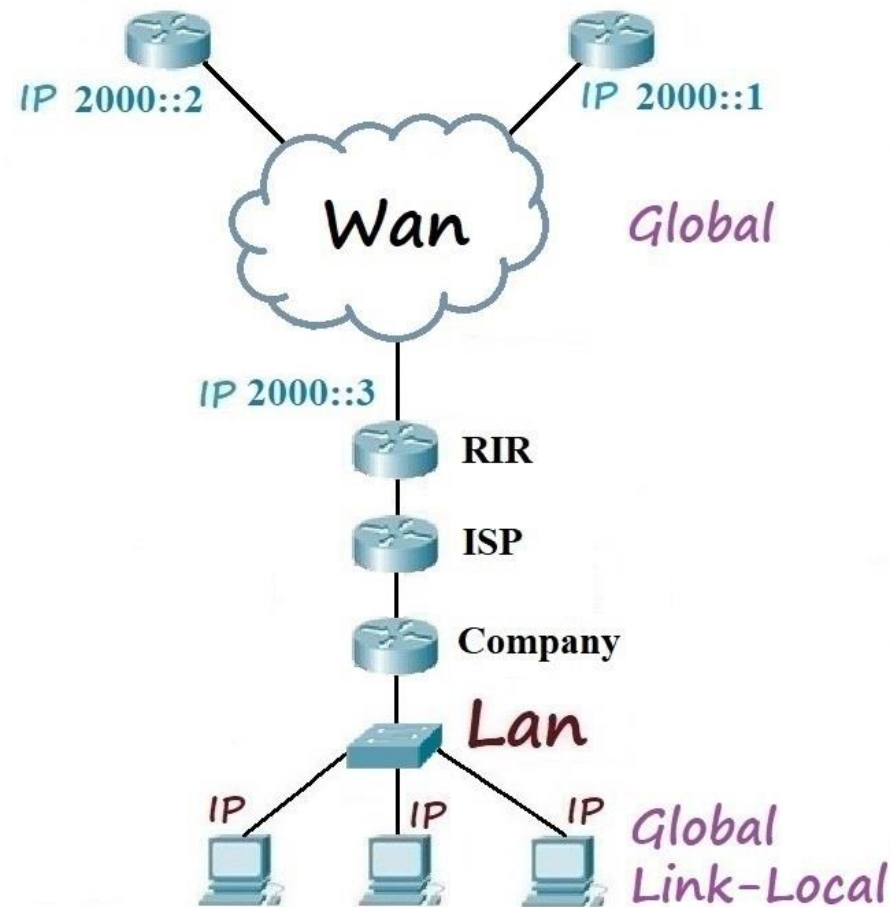
Link-Local

Unique-local

Assigned

Solicited-Node

Nearest IP



## - IPv6

- IANA X : X : X : X : X : X : X : X

Default Route ::  
 Unspecified ad ::  
 Loopback Test ::1

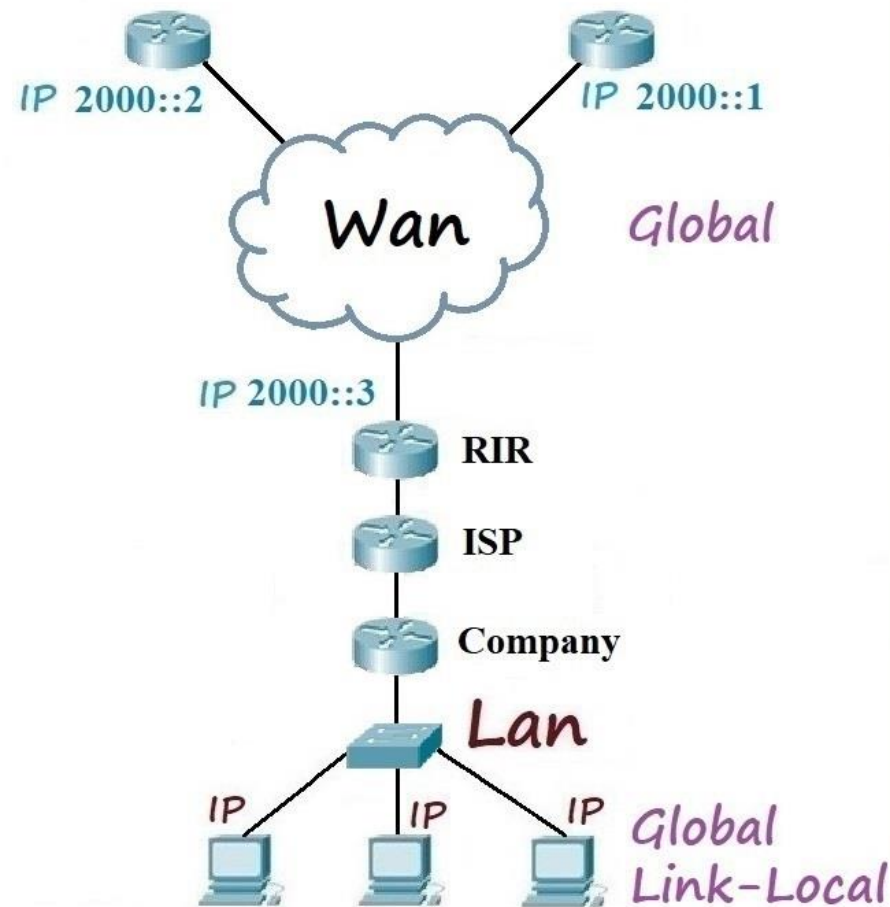
```

C:\Users\Pc > IPconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  :
    IPv6 Address . . . . . : 2000:db8::500c:634a:a43e:cdc6
    Link-local IPv6 Address . . . . : fe80::614a:a4ff:fe3e:cdc6
    IPv4 Address . . . . . : 192.168.1.190
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1
    
```

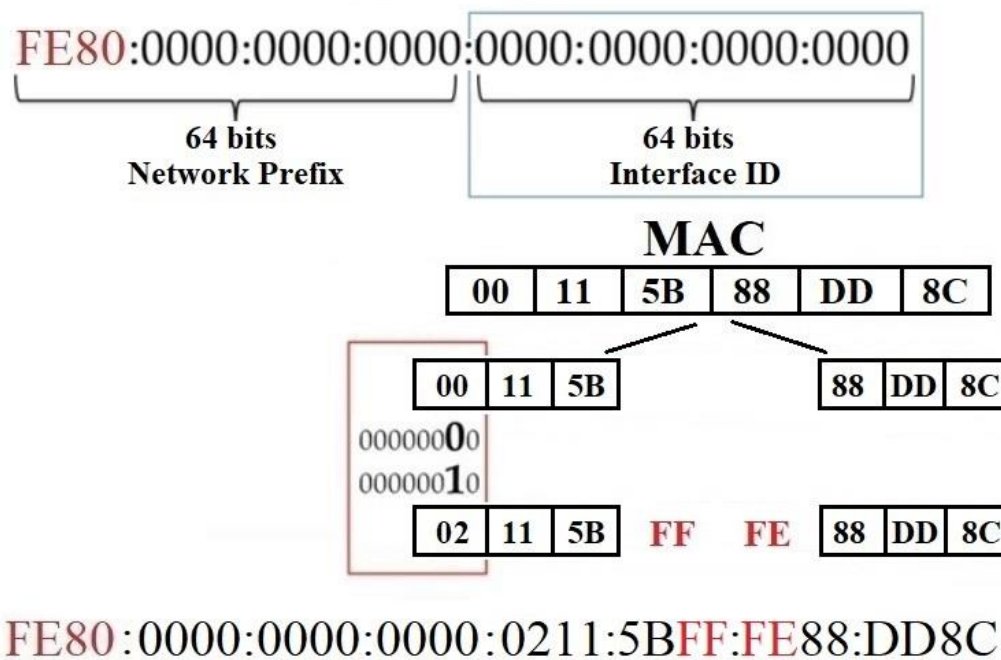


# - IPv6 Unicast

## Link-Local

FE80 :: Mac Address

This method is called  
**EUI-64 Format**



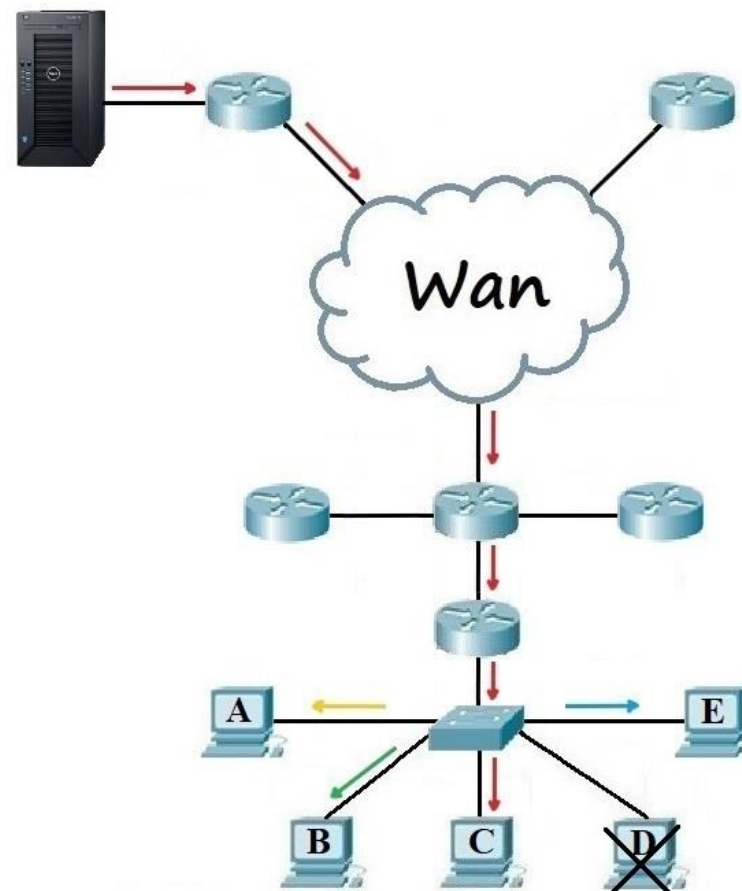
## - IPv6 Multicast

### Multicast IPv4

- 224.0.0.1** All Device on this subnet
- 224.0.0.2** All Routers
- 224.0.0.5** All OSPF routers

### Multicast IPv6

- FF02::1** All Device on this subnet  
Mac Multicast **33-33-00-00-00-01**
- FF02::2** All Routers  
Mac Multicast **33-33-00-00-00-02**
- FF02::5** All OSPF router  
Mac Multicast **33-33-00-00-00-05**





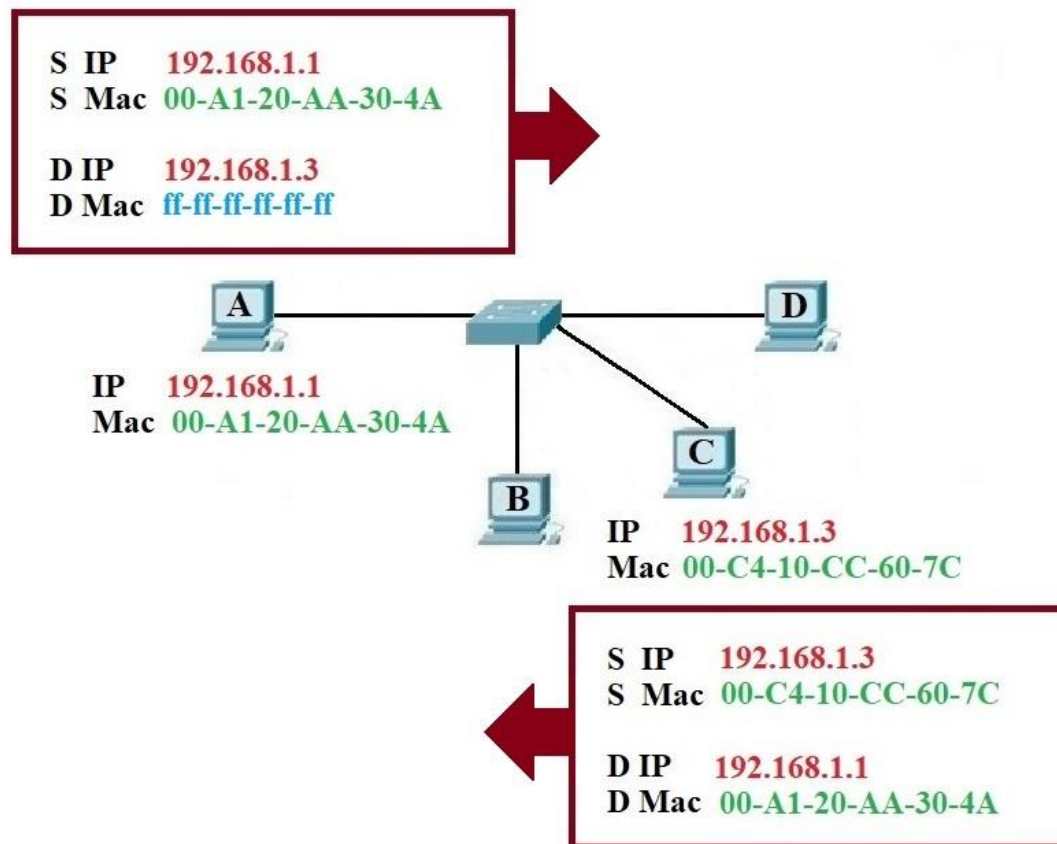
## - IPv6 Multicast

### Broadcast IPv4

IP **x.x.x.x**  
Mac **ff-ff-ff-ff-ff-ff**

### Solicited-Node IPv6

IP Solicited-Node **FF02::1:FFxx:xxxx**  
Mac Multicast **33-33-FF-xx-xx-xx**





# - IPv6 Multicast

## Broadcast IPv4

IP **x.x.x.x**  
 Mac **ff-ff-ff-ff-ff-ff**

## Solicited-Node IPv6

IP Solicited-Node **FF02::1:FFxx:xxxx**  
 Mac Multicast **33-33-FF-xx-xx-xx**

S IP **FE80::02A1:20FF:FEAA:304A**  
 S Mac **00-A1-20-AA-30-4A**

Target IP **FE80::02C4:10FF:FECC:607C**

D IP **FF02::1:FFCC:607C**  
 D Mac **33-33-FF-CC-60-7C**

IPv6 **FE80::02A1:20FF:FEAA:304A**  
 Mac **00-A1-20-AA-30-4A**

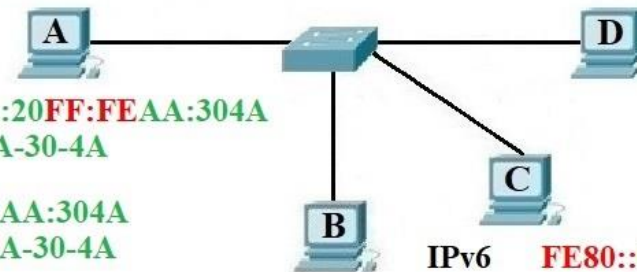
IP SN **FF02::1:FFAA:304A**  
 MacM **33-33-FF-AA-30-4A**

IPv6 **FE80::02C4:10FF:FECC:607C**  
 Mac **00-C4-10-CC-60-7C**

IP SN **FF02::1:FFCC:607C**  
 MacM **33-33-FF-CC-60-7C**

S IP **FE80::02C4:10FF:FECC:607C**  
 S Mac **00-C4-10-CC-60-7C**

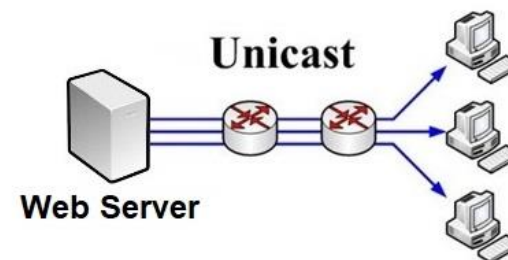
D IP **FE80::02A1:20FF:FEAA:304A**  
 D Mac **00-A1-20-AA-30-4A**



## - IPv6 Anycast

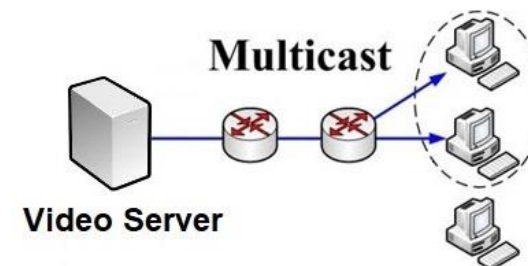
### Unicast

- Delivery to single interface
- **one-to-one** communication
- Used with Web and Download files



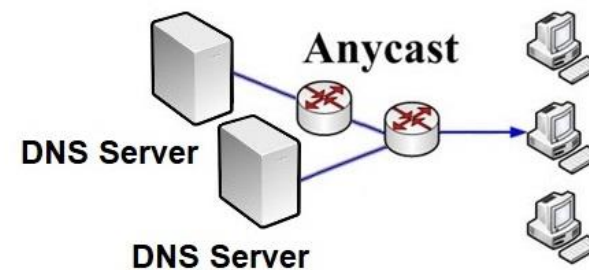
### Multicast

- Delivery to Multi-interface
- **one-to-many** communication
- Used with Live video and IRC

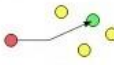
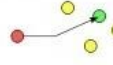






### Anycast

- Delivery to single interface
- **one-to-nearest** communication
- Used with DNS



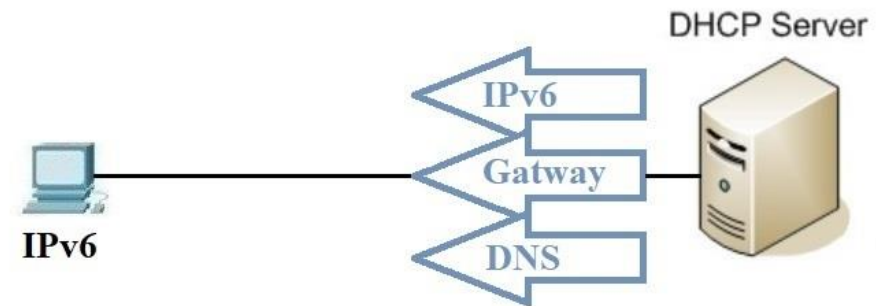
## - IPv6 vs IPv4

IPv4		IPv6	
Public		Global	2000::/3
Private		Unique-local	FC00::/7
APIPA	169.254.0.0	Link-local	FE80::/10
Loopback	127.0.0.1	Loopback	::1
Unicast		Unicast	
Multicast		Multicast	
Broadcast		anycast	

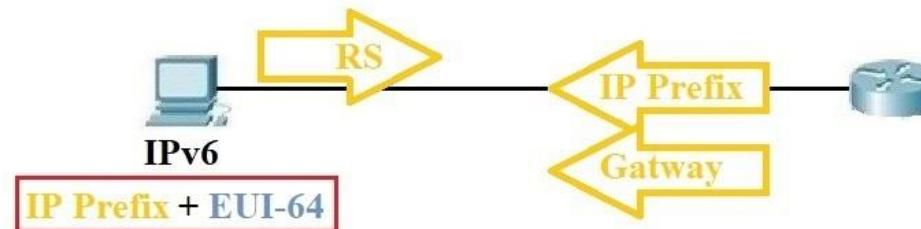
# - IPv6

## Three Methods :

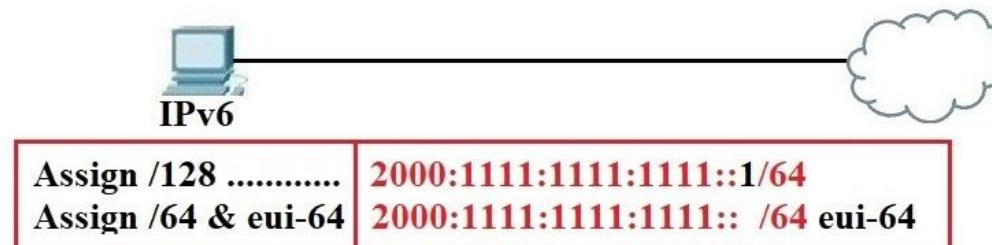
- DHCP ( Statefull )



- Autoconfig ( Stateless )  
( SLAAC )



- Static ( Manual )



## - IPv6

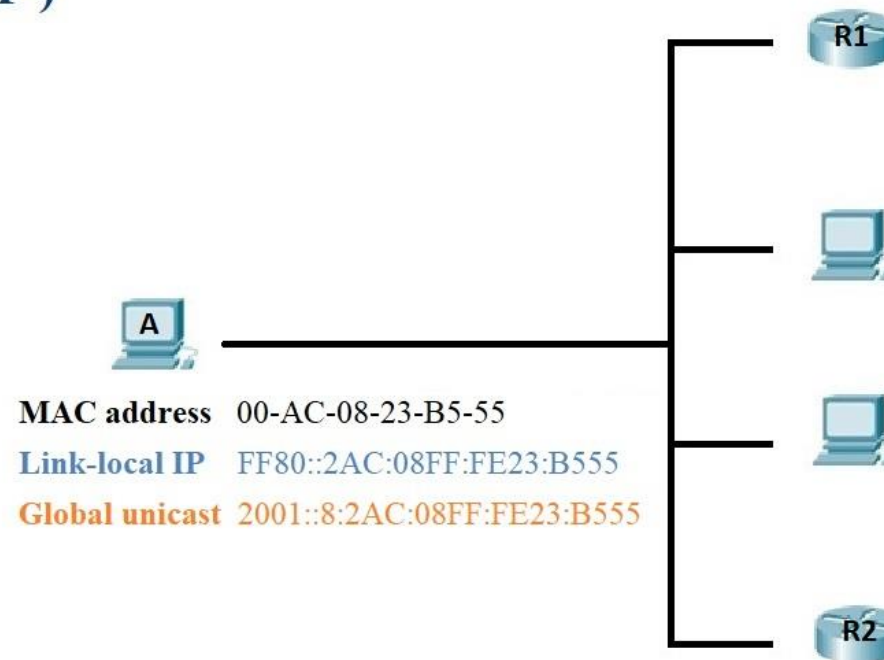
### Neighbor Discovery Protocol ( NDP )

NDP Use Five type ICMPv6 packet :

- 1- NS ( Neighbor Solicitation )
- 2- NA ( Neighbor Advertisement )
- 3- RS ( Router Solicitation )
- 4- RA ( Router Advertisement )
- 5- Re ( Redirect )

### Multicast

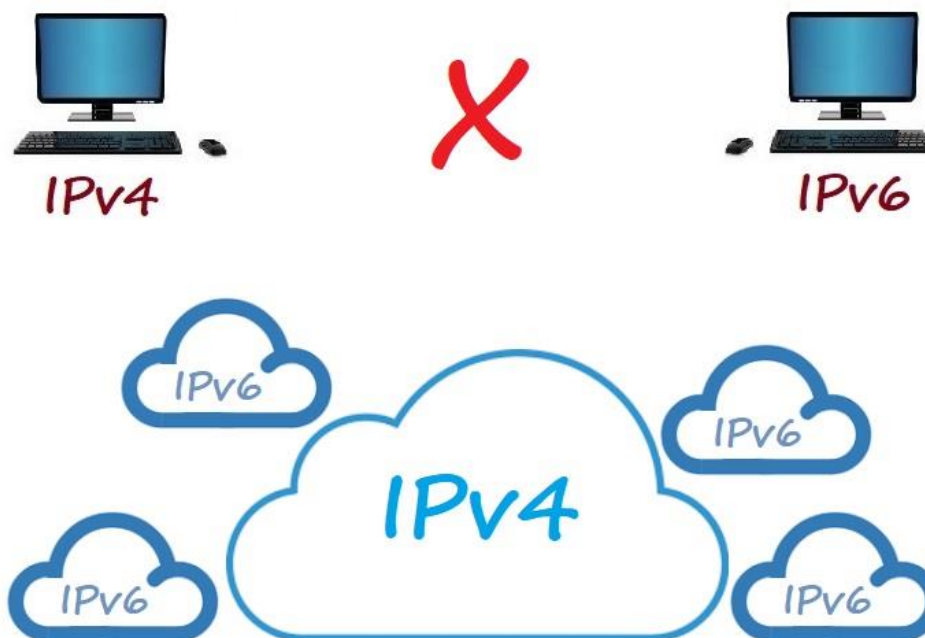
- FF02::1** All Device
- FF02::2** All Router
- FF02::5** All OSPF router
- FF02::1:FFxx:xxxx** Solicited-Node





## - IPv6

- Transition Mechanisms from IPv4-to-IPv6 :





## - IPv6

### - Transition Mechanisms from IPv6-to-IPv4 :

#### -Dual Stack

Run IPv6 & IPv4 on the same Network



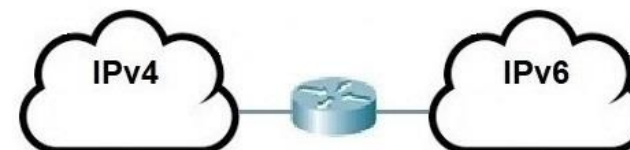
#### -Tunnel

Encapsulate IPv6 Packets inside IPv4 Packets



#### -Translation

IPv4-IPv6 Conversion Using NAT



## - IPv6

### - Transition Mechanisms from IPv6-to-IPv4 :

#### -Dual Stack

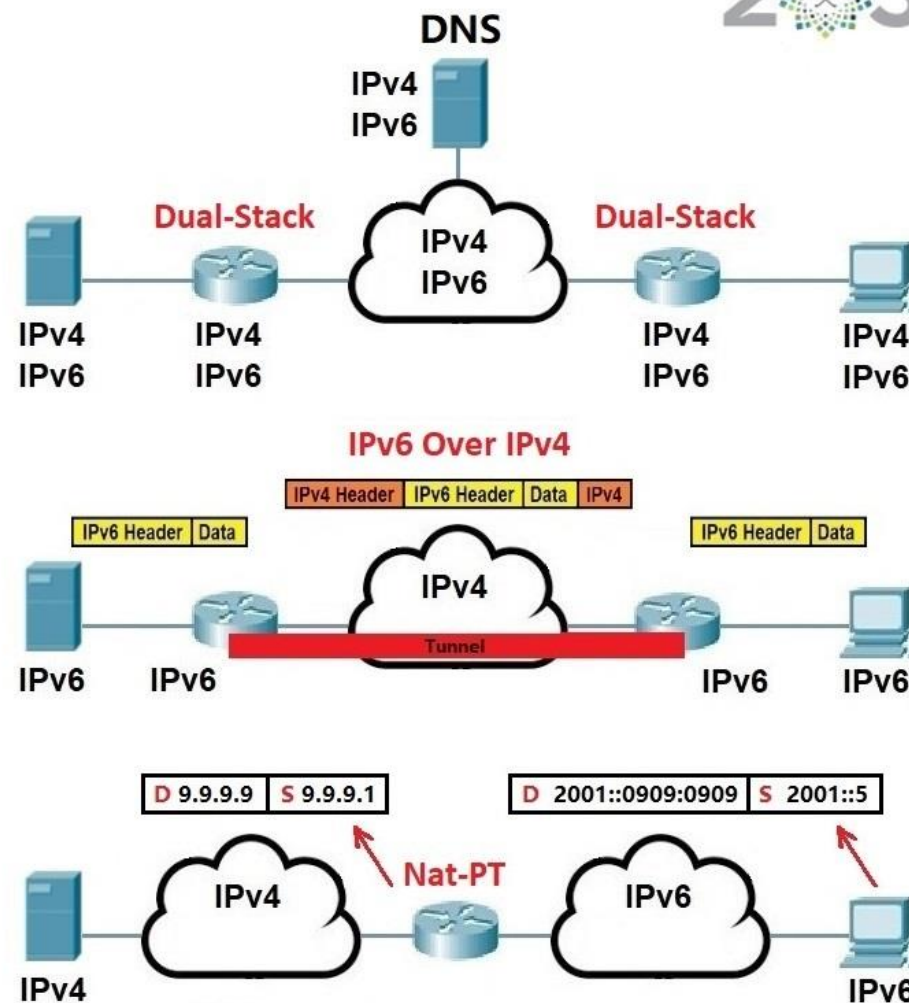
- IPv6 and IPv4 Enable

#### -Tunnel

- IPv6 Over IPv4 tunnel ( Manual )
- Teredo tunnel ( Microsoft - 2001:: )
- ISATAP tunnel ( internal area )
- 6to4 tunnel ( point-multipoint )
- 6in4 tunnel ( point-point )

#### -Translation

- NAT64
- NAT46
- NAT-PT=NAT64+NAT46



## - IPv6

### - IPv4 Embedded : Converting IPv4 -to-IPv6

#### ★ IPv4-Mapped IPv6

192.1.1.3

0:0:0:0:0:ffff:192.1.1.3

::ffff:192.1.1.3

#### ★ IPv4-Compatible

192.1.1.3

( *Deprecated* )

0:0:0:0:0:0:192.1.1.3

::192.1.1.3