

IPv6 Hands-on session: *Basic router configuration examples*

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*Athanassios Liakopoulos
(aliako@grnet.gr)*

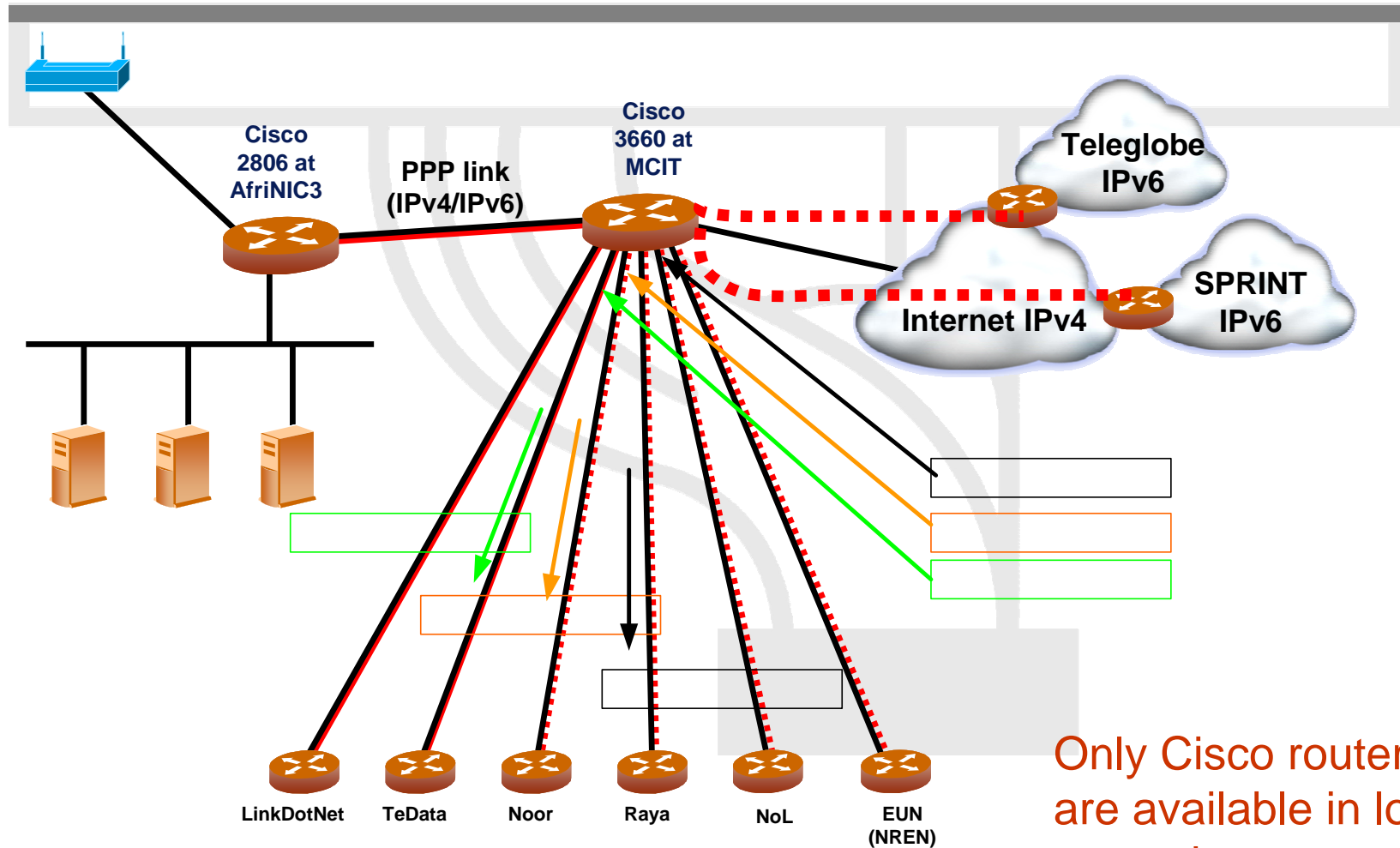


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Testbed network topology



Only Cisco routers are available in local network

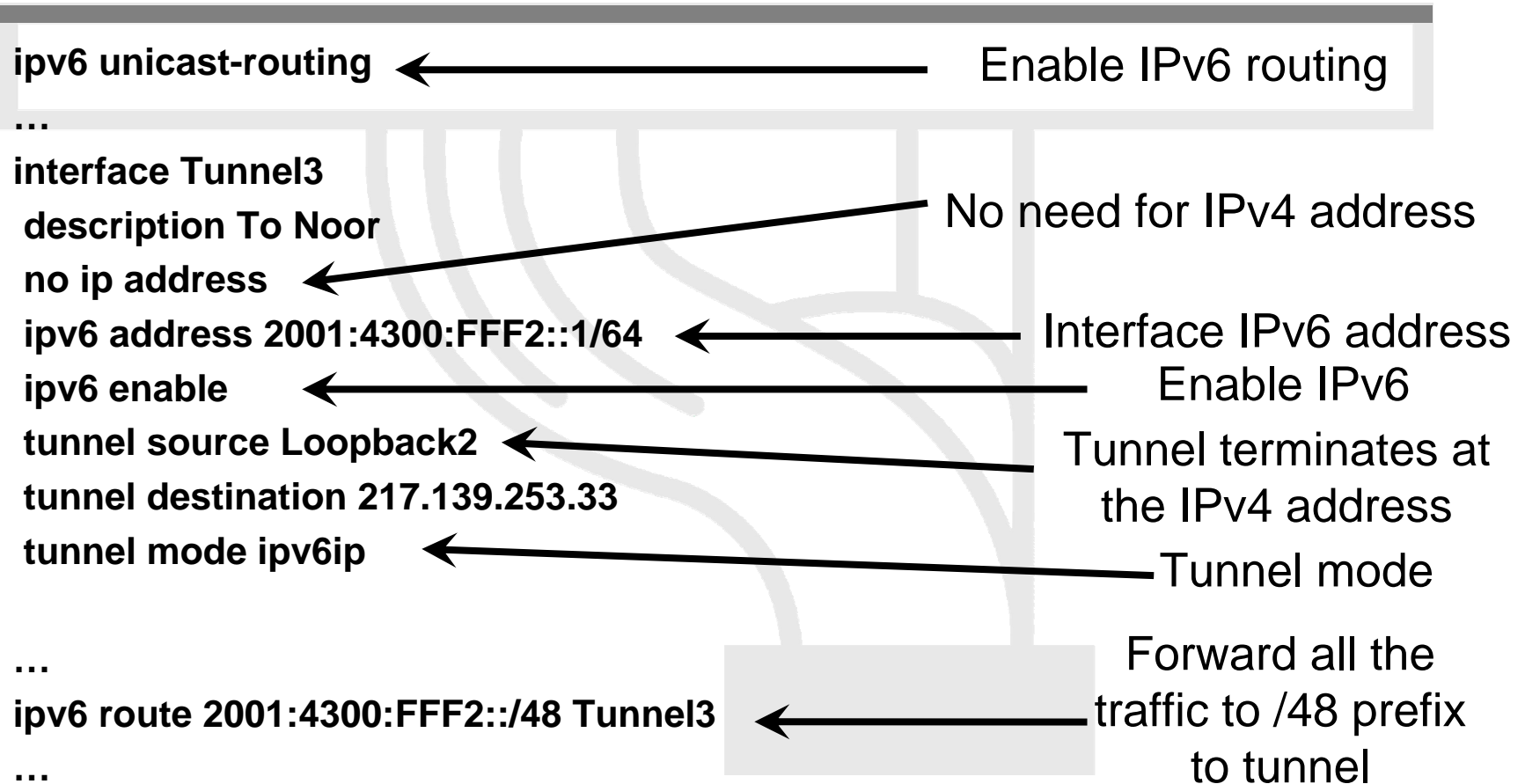


Basic configuration (1/2)

- Enable IPv6 routing
- Activate IPv6 at the router interfaces
- Configure IPv6 addresses
- Configure route advertisements



Basic configuration (2/2)



Example of tunnel configuration discussed in the previous session



Intra-domain routing protocol

- RIPng, EIGRP
 - distance vector
- OSPFv3 (RFC2740), IS-IS (draft-ietf-isis-ipv6-06.txt)
 - link state protocols
 - two level hierarchy
 - faster converge than distance vector counterparts

IPv6 and IPv4 routing protocols
may not be the same



OSPFv3 configuration

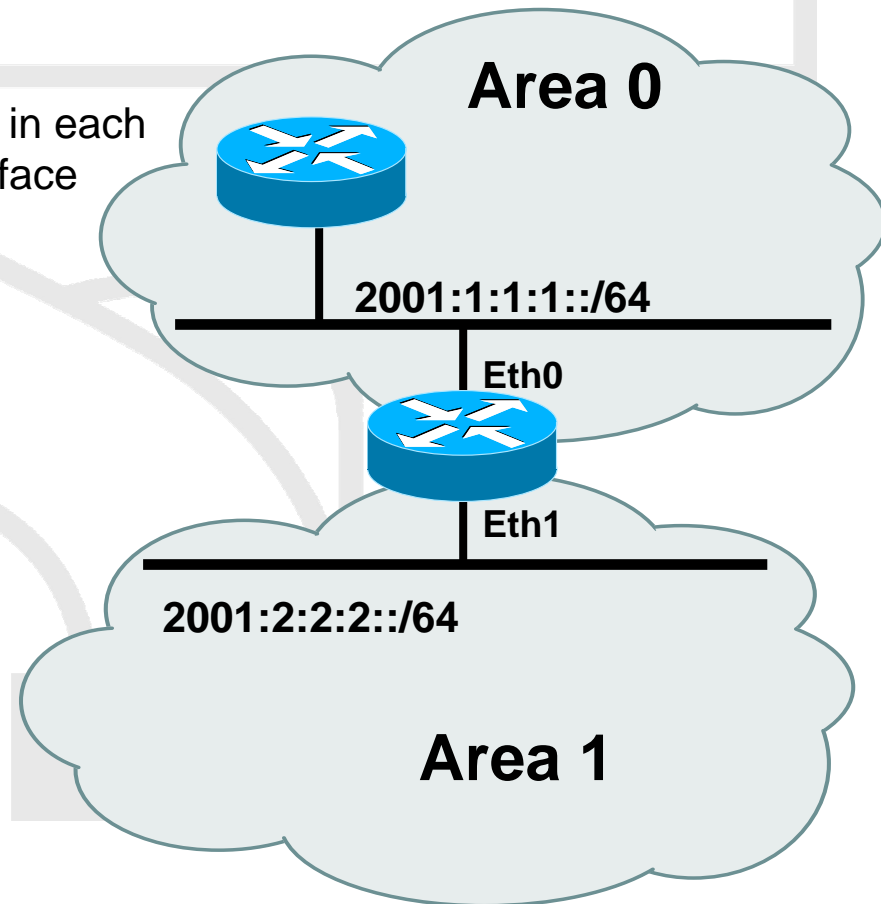
```
interface Ethernet0  
  ipv6 address 2001:1:1:1::1/64  
  ipv6 ospf 1 area 0
```

```
interface Ethernet1  
  ipv6 address 2001:2:2:2::2/64  
  ipv6 ospf 1 area 1
```

```
ipv6 router ospf 1  
  router-id 1.1.1.1  
  area 1 range 2001:2:2::/48
```

Activate in each interface

Summary of prefixes in the area 1



Similar to OSPFv2



OSPFv3 troubleshooting

- Basic commands
 - show ipv6 ospf [<process ID>]
 - show ipv6 ospf neighbor
 - clear ipv6 ospf [<process ID>]
- Debug
 - debug ipv6 ospf adj
 - debug ipv6 ospf hello
 - debug ipv6 ospf packets
- Get OSPF database information
 - show ipv6 ospf [<process ID>] database link
 - show ipv6 ospf [<process ID>] database prefix

```
Router 2# show ipv6 route ospf
IPv6 Routing Table - 9 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
...
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
O 2001:1:1:2::1/128 [110/1]
  via FE80::205:5FFF:FEAF:2C38, Ethernet0
OI 2001:2:2::/48 [110/2]
  via FE80::205:5FFF:FEAF:2C38, Ethernet0
```



Border Gateway Protocol (BGP)

- BGP is an inter-domain routing protocol
 - Multi-protocol extensions for BGP-4 support IPv6 address prefixes (RFC2858)
- Each domain is assigned an Autonomous System (AS) number
- Routing decisions are based on the AS path length



BGP information exchange

- Routers in different peering domains exchange routing information
 - peering is implemented using external BGP (eBGP)
 - advertise prefixes, filter incoming prefixes
- Routers in the same domain select the best routes, i.e. the next-hop, for all known external prefixes
 - information is exchanged via internal BGP (iBGP)
 - inject best routes to the intra-domain routing table or forward all external routes to route reflector.



BGP configuration (1/3)

- Completely separated configuration sections for IPv4 (*unicast & multicast*) and IPv6 (*unicast and multicast*)
 - Similar configuration steps for both protocols
- BGP configurations starts with the “*router bgp <AS>*”



BGP configuration (2/3)

```
router bgp 31065
...
neighbor 2001:5A0:400::29 remote-as 6453
neighbor 2001:5A0:400::29 peer-group mcit
neighbor 2001:5A0:400::29 description teleglobe
neighbor 3FFE:2900:300:1A::1 remote-as 6175
neighbor 3FFE:2900:300:1A::1 peer-group mcit
neighbor 3FFE:2900:300:1A::1 description Sprint
...
!
address-family ipv6
neighbor 2001:5A0:400::29 activate
neighbor 3FFE:2900:300:1A::1 activate
network 2001:4300::/32
network 2001:4300:1::/48
network 2001:4300:1:1:1:1:1:0/112
exit-address-family
!
```

AS number

BGP neighbours

IPv6 address family configuration

Advertised prefixes



BGP configuration (3/3)

```
router bgp 31065
```

```
...
```

```
neighbor 2001:5A0:400::29 remote-as 6453
```

```
neighbor 2001:5A0:400::29 peer-group mcit
```

```
neighbor 2001:5A0:400::29 description teleglobe
```

```
neighbor 3FFE:2900:300:1A::1 remote-as 6175
```

```
neighbor 3FFE:2900:300:1A::1 peer-group mcit
```

```
neighbor 3FFE:2900:300:1A::1 description Sprint
```

```
...
```

```
!
```

```
...
```

```
ipv6 prefix-list allip seq 5 deny 2001:4300::/32
```

```
ipv6 prefix-list allip seq 10 permit ::/0 le 128
```

```
route-map R-out permit 10
```

```
match ipv6 address prefix-list allip
```

```
set community no-export
```

```
!
```

Participate to a group

Filter prefixes for a specific group



Troubleshooting (1/2)

- Follow similar steps as in IPv4!

```
ipv6-router#show bgp ipv6 summary
```

```
...
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
2001:5A0:400::29									
	4	6453	18829	71205	97825	0	0	23:23:53	375
3FFE:2900:300:1A::1									
	4	6175	13673	60781	97825	0	0	23:23:36	605



Troubleshooting (2/2)

```
ipv6-router#show bgp ipv6
```

```
BGP table version is 97838, local router ID is 81.21.98.140
```

```
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,  
r RIB-failure Origin codes: i - IGP, e - EGP, ? - incomplete
```

Network	Next Hop	Metric	LocPrf	Weight	Path
*> 2001:200::/32		3FFE:2900:300:1A::1	81		
		0	6175	2497	2500 i
*> 2001:200:12D::/48		2001:470:1F00:FFFF::F5E			
		0	6939	6939	10566 378 6 17832 9270 7660 18083 i
...					

Check also BGP neighbour status,
received/transmitted routes, specific prefixes



Questions?



Thank you!

