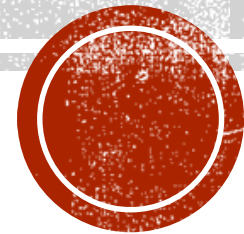


TUNNELING OVERVIEW

AUTOMATIC 6TO4 AND ISATAP
P2P-MANUALLY IPV6 OVER IPV4

Massimiliano Sbaraglia



6TO4 AUTOMATIC

- Point to Multipoint design
- Connecting between IPv6 hosts through IPv4 network/cloud NBMA
- Tunnel operates per packet-basis to encapsulation to destination address by combining the ipv6 prefix with the globally unique destination 6to4 border routers ipv4 address
- Tunnel mode: ipv6ip 6t4
- The destinations address are automatically determined
- Range IPv6 address: 2002::/16 reserved only for tunneling
- Format address:

2002:

Prefix

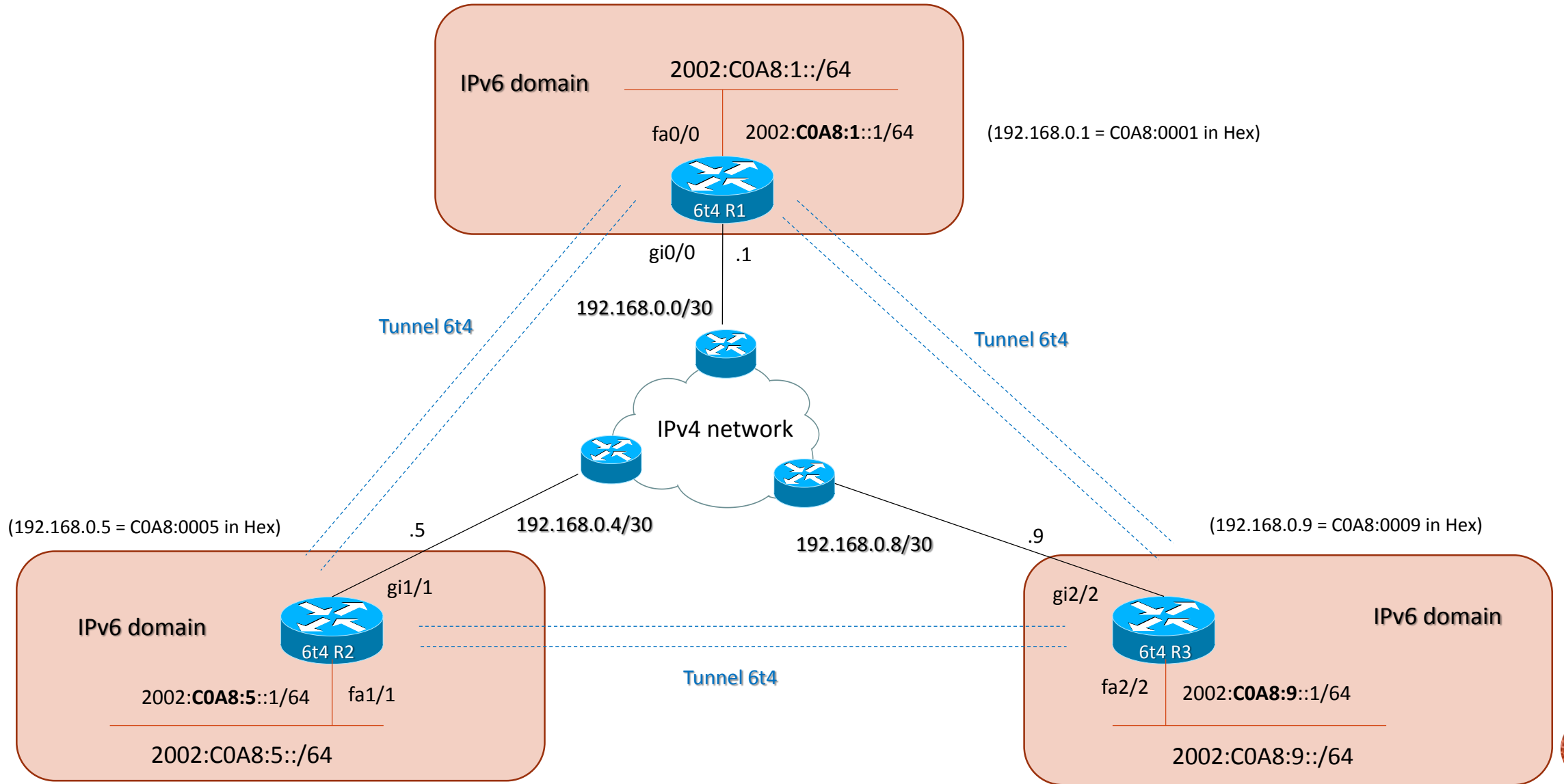
C0A8:0101:

IPv4 end-point
address in HEX

subnet ::/64



6TO4 AUTOMATIC DESIGN



6TO4 AUTOMATIC CONFIGURATION

6t4 R1# (la configurazione di R2 ed R3 è identica cambiando gli indirizzi delle interfacce)

```
interface fa0/0
description subnet-IPv6
no ip address
ipv6 address 2002:c0a8:1::1/64
!
interface gi0/0
description IPv4-address
ip address 192.168.0.1 255.255.255.252
!
ipv6 general-prefix MYIPv6 gigabitethernet 0/0 → se si vuole ottenere in modo automatico un indirizzo ipv6 from ipv4
!
interface tunnel 0
description 6t4-tunnel
no ip address
ipv6 address 2002:c0a8:1::1/64
tunnel source gi0/0
tunnel mode ipv6ip 6to4
!
ipv6 route 2002::/16 tunnel 0 (le destinazioni sono automaticamente determinate)
```



ISATAP INTRA SITE AUTOMATIC TUNNEL ADDRESSING PROTOCOL

- Connecting between host-to-host, router-to-host, host-to-router
- Use underlying IPv4 network as NBMA cloud
- Tunnel operates per packet-basis to encapsulation (different by 6to4)
- ISATAP interface identifier is (on the middle part of address): 0000:5EFE
- Tunnel mode: ipv6ip isatap
- The destinations address are automatically determined
- Format address ISATAP

[64-bit link-local or global unicast prefix] : 0000:5EFE: [ipv4 address isatap link]

Esempio:

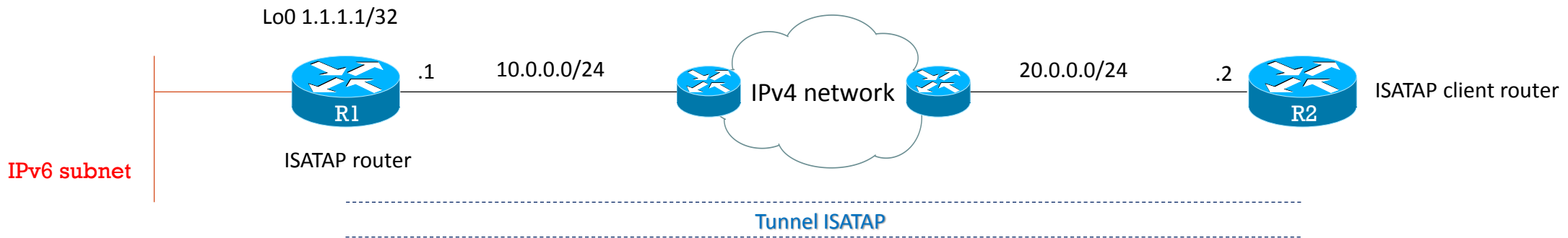
IPv6 prefix = 2001:0db8:0abc:0def::/64

IPv4 tunnel destination = 172.20.20.1 (converted in hex = ac14:1401)

ISATAP address = 2001:0db8:0abc:0def:0000:5e5f:ac14:1401



ISATAP CONFIGURATION EXAMPLE



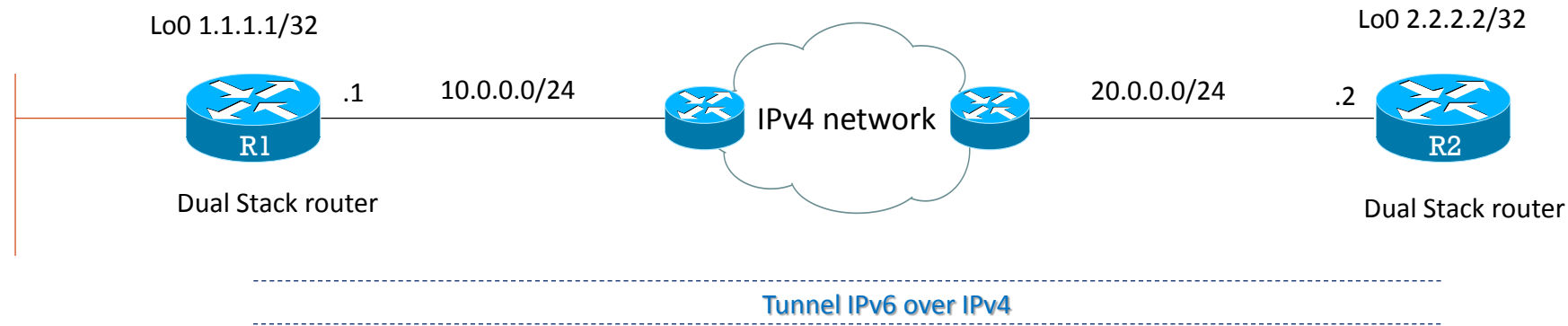
```
ipv6 unicast-routing
!  
interface Loopback0  
ip address 1.1.1.1 255.255.255.255  
!  
interface Tunnel 1  
no ip address  
no ip redirects  
ipv6 address 2001:DB8:CAFE:65::/64 eui-64 <<Any /64 IPv6 address will work>>  
no ipv6 nd ra suppress <<IPv6 ra is suppressed by default on tunnel. Need to re-enable for client auto-configuration>  
tunnel source Loopback0  
tunnel mode ipv6ip isatap
```

```
interface ethernet0  
ip address 20.0.0.2 255.255.255.0  
!  
interface Tunnel 1  
no ip address  
ipv6 address autoconfig  
ipv6 enable  
tunnel mode ipv6ip  
tunnel source ethernet0  
tunnel destination 1.1.1.1
```



MANUALLY TUNNELS IPV6 OVER IPV4

- Point to Point design
- Manual configuratons IPv6 over IPv4 tunnel
- Tunnel mode: ipv6ip
- Configuration similar to GRE



```
interface tunnel 0
no ip address
ipv6 address 2001:db8::1:1/64
tunnel source loopback 0
tunnel destination 2.2.2.2
tunnel mode ipv6ip
```

```
interface tunnel 0
no ip address
ipv6 address 2001:db8::1:2/64
tunnel source loopback 0
tunnel destination 1.1.1.1
tunnel mode ipv6ip
```



TUNNELS SUMMARY

Tunnel Type	Tunnel Mode	Destination Prefix
Manually	ipv6ip	IPv4 address
GRE over IPv4	gre ip	IPv4 address
Automatic 6to4	ipv6ip 6to4	automatically determined
ISATAP	ipv6ip isatap	automatically determined
Automatic IPv4 compatible	ipv6ip auto-tunnel	automatically determined

