
6over4

Madrid Global IPv6 Summit 2002

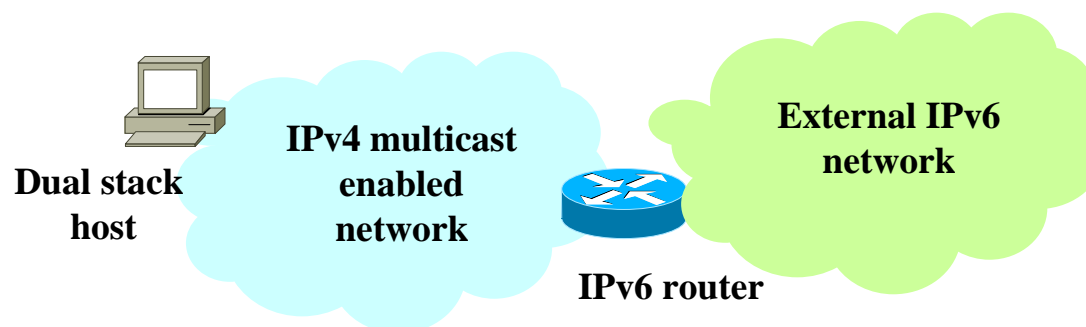
Alberto López Toledo

alberto@dit.upm.es, alberto@dif.um.es

6over4

The 6over4 mechanism allows isolate IPv6 hosts not directly connected to IPv6 router to become fully IPv6 functional hosts.[RFC 2529]

- ◆ Uses a multicast enabled IPv4 network as a “virtual local link”.
- ◆ Aimed to first stages of IPv6 migration, where several IPv6 hosts may be scattered around an IPv4 domain.

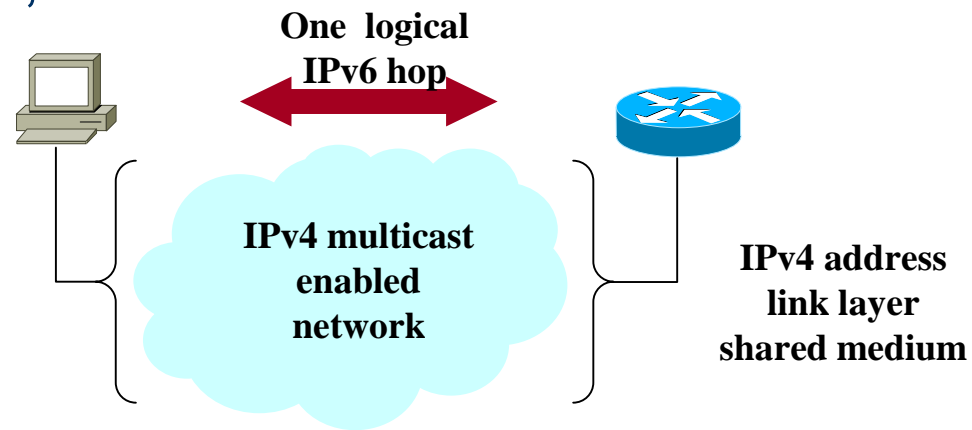


Requirements

- ◆ Minimal requirements:
 - ▶ An IPv6 enabled router with 6over4 support connected to an external IPv6 world.
 - ▶ A multicast enabled network connecting the host and the router.
 - ▶ 6over4 hosts.
- ◆ It uses dynamic tunnels to connect to the IPv6 router.
 - ▶ Tunnels are built by hosts.

6over4 basics

- ◆ Basic idea: Simulate an Ethernet link layer by using IPv4 multicast scoped addresses:
 - ▶ Instead of connected to the same shared link, 6over4 hosts are connected to the same 'shared' multicast scoped domain.
 - ▶ Neighbor discovery mechanisms used between 6over4 hosts and IPv6 router is used the same way as in an Ethernet network. Instead of encapsulating to MAC frames, to IPv4 packets.
- ◆ Mapping of IPv6 to link layer addresses in ND is the same, but this time IPv4 addresses are 'link layer'.



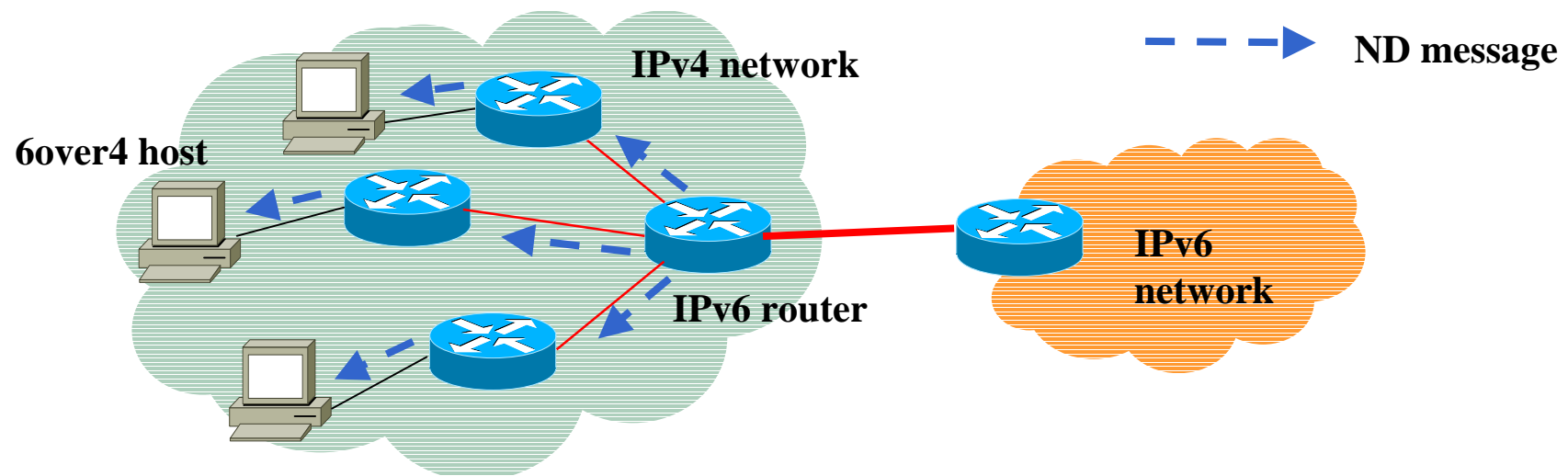
6over4 Neighbor Discovery

- ◆ The whole IPv4 network is used as a shared media link-layer by means of the following IPv4 multicast scoped addresses [RFC 2365]:
 - ▶ All-nodes multicast address (239.X.0.1): used to reach every node in the IPv4 domain supporting this mechanism. Equivalent to an Ethernet *broadcast*.
 - ▶ All-routers multicast address (239.X.0.2). Used to reach every router in the IPv4 domain supporting this mechanism.
 - ▶ Solicited-node multicast address (239.X.C.D). Computed as a function of the solicited-target's address. (Being C and D the low order bits of the IPv4 address)
- ◆ In all these addresses X is the Local Scope Identifier (usually should be 192 [RFC 2365]).

6over4 operation I

◆ First step:

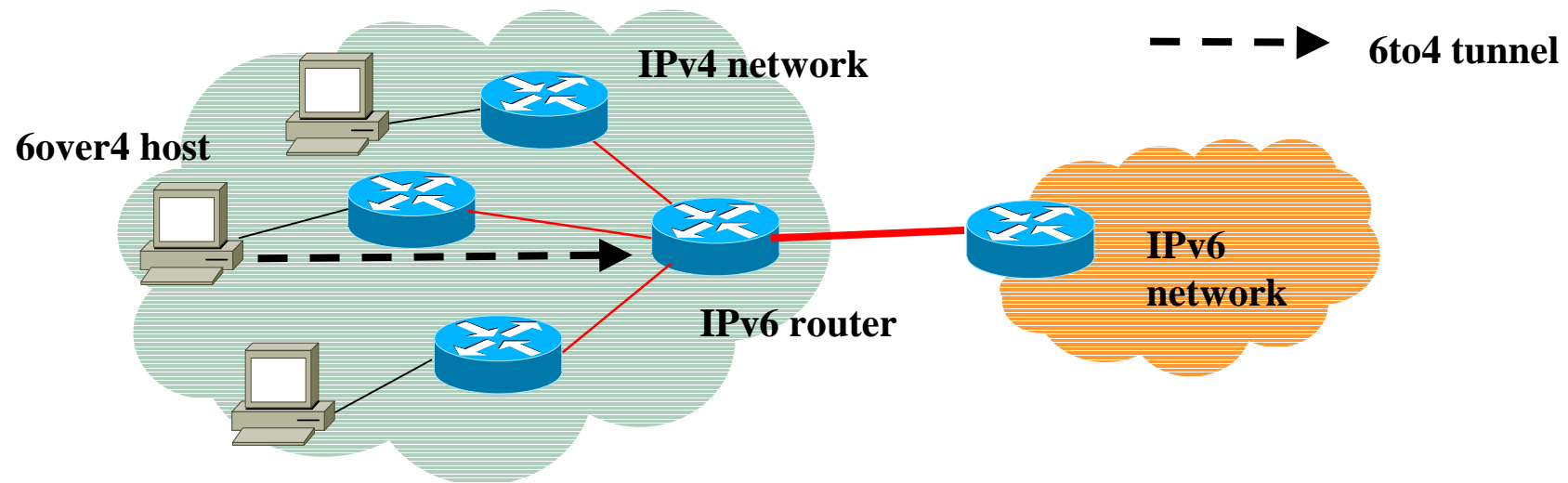
- ▶ “6over4” hosts obtain their configuration (link-local address and prefix, IPv4 address of the IPv6-enabled router, etc...) using the ND protocol over IPv4 multicast.
- ▶ IPv6 router advertises 2 prefixes: one for the native LAN and another for the “6over4” domain.
- ▶ Prefix length for link local addresses must be /128.



6over4 operation II

◆ Second step:

- ▶ Once host has discovered the gateway, IPv6 datagrams are sent encapsulated in IPv4 datagrams with protocol type 41 (same as 6to4).
- ▶ The hosts are responsible for doing that tunneling.



6over4

◆ Advantages:

- ▶ Nodes can discover other IPv6 hosts automatically.
- ▶ IPv6 hosts do not require compatible IPv4 addresses or configured tunnels (they are automatic).
- ▶ Eliminates any link layer restrictions, as host being migrated can be widely spread along the domain and even located at several hops from the IPv6 enabled router.

◆ Disadvantages:

- ▶ Limitation on the number of tunnels supported by the 6over4 router.
- ▶ Ipv4 network need to support multicast (management, scalability and other multicast related problems).
- ▶ Each Ipv6 network need to have a 6over4 border router.
- ▶ Not adopted, only implementation Windows2000/NT.

Thanks for your attention!!