IPv6 Autoconfiguration Stateless and Stateful

Piers O'Hanlon

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Acknowledgements

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Agenda

- Stateless Autoconfiguration
- Stateful Autoconfiguration (DHCPv6)
- Conclusions

Stateless Autoconfiguration

- Hosts should be plug & play
- Uses some of the Neighbor Discovery ICMPv6 messages
- When booting, the host asks for network parameters:
  - IPv6 prefix(es)
  - default router address(es)
  - hop limit
  - (link local) MTU

Stateless Autoconfiguration

- Only routers have to be manually configured
  - but work on prefix delegation is in progress

    (http://www.ietf.org/rfc/rfc3633.txt)

- Hosts can get automatically an IPv6 address
  - BUT it isn't automatically registered in the DNS
- But servers should be manually configured

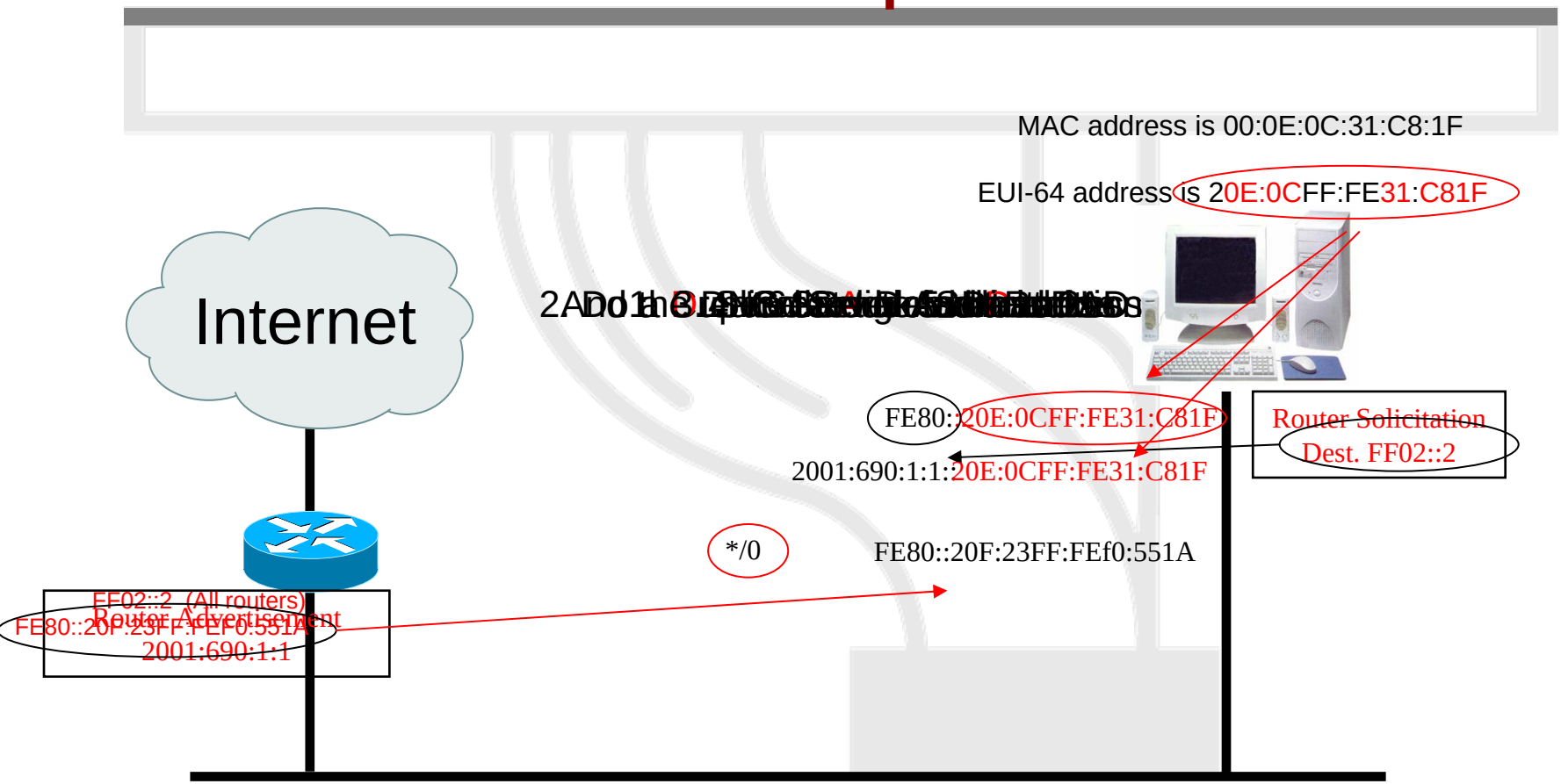
Stateless Autoconfiguration

- IPv6 Stateless Address Autoconfiguration is described in RFC 2462
- Hosts are listening for Router Advertisements (RA) messages, periodically transmited by routers
  - Hosts can also send Solicitations to the all-routers multicast group
- RA messages coming from the router(s) on the link identify the subnet
- Allows a host to create a global IPv6 address from:
  - Its interface identifier (EUI-64 address)
  - Link Prefix (obtained via Router Advertisement)
- Global Address = combine *Link Prefix* with *EUI-64 address*

Stateless Autoconfiguration

- Usually, the router sending the RA messages is used, by hosts, as the default router
- If the RA doesn't carry any prefix
  - The hosts don't configure (automatically) any global IPv6 address (but may configure the default gateway address)
- RA messages contain two flags indicating what type of stateful autoconfiguration (if any) should be performed
- It's impossible to automatically send DNS server addresses
- IPv6 addresses depends on NIC card
  - Unless privacy extensions enabled

Stateless Autoconfiguration example



Stateful autoconfiguration (DHCPv6)

- Dynamic Host Configuration Protocol for IPv6
  - RFC 3315
  - stateful counterpart to IPv6 Stateless Address Autoconfiguration.
- According to RFC3315 DHCPv6 is used when:
  - no router is found
  - Or if Router advertisement message enable use of DHCP

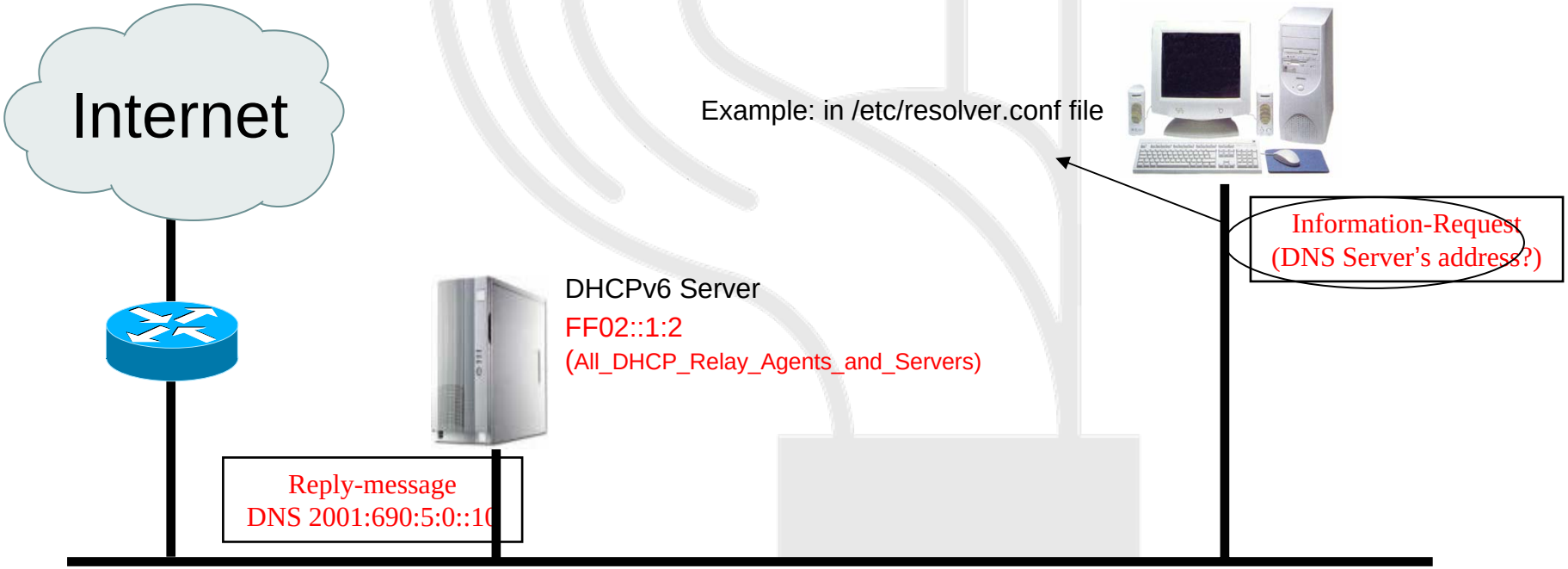
Stateful autoconfiguration (DHCPv6)

- DHCPv6 works in a client-server model
  - Server
    - Responds to requests from clients
    - Optionally provides the client with:
      - IPv6 addresses
      - Other configuration parameters (DNS servers…)
    - Is listening on multicast addresses:
      - All_DHCP_Relay_Agents_and_Servers (FF02::1:2)
      - All_DHCP_Servers (FF05::1:3)
    - Memorize client's state
    - Provide means for securing access control to network resources

Stateful autoconfiguration (DHCPv6)

- Client
  - initiates requests on a link to obtain configuration parameters
  - use its link local address to connect the server
  - Send requests to FF02::1:2 multicast address (All_DHCP_Relay_Agents_and_Servers)
- Relay agent
  - node that acts as an intermediary to deliver DHCP messages between clients and servers
  - is on the same link as the client
  - Is listening on multicast addresses:
    - All_DHCP_Relay_Agents_and_Servers (FF02::1:2)

Stateful Autoconfiguration example



Conclusions

- The two types of configuration complement each other
  - Example: we can obtain the address from stateless autoconfiguration and the DNS server address from DHCPv6
- In dual-stack networks we can obtain DNS server addresses from **DHCPv4**
- DHCPv6 clients/servers still aren't widely available in Operating Systems.
  - So, we still need to run a client/server
    - Not transparent to users
  - Windows 'Vista/Longhorn Server' will support DHCPv6

Questions?