IPv6 Autoconfiguration Stateless and Stateful

Piers O'Hanlon

Copy ... Rights

- This slide set is the ownership of the 6DISS project via its partners
- The Powerpoint version of this material may be reused and modified only with written authorization
- Using part of this material must mention 6DISS courtesy
- PDF files are available from *www.6diss.org*
- Looking for a contact ?
- Mail to : martin.potts@martel-consulting.ch
- Or bernard.tuy@renater.fr

Acknowledgements

- Main authors
  - Miguel Baptista, FCCN, Portugal
  - Carlos Friaças, FCCN, Portugal
- Contributors
  - Mónica Domingues, FCCN, Portugal
  - Paulo Ferreira, FCCN, Portugal
  - Bernard Tuy, Renater, France
  - Piers O'Hanlon, UCL, UK

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

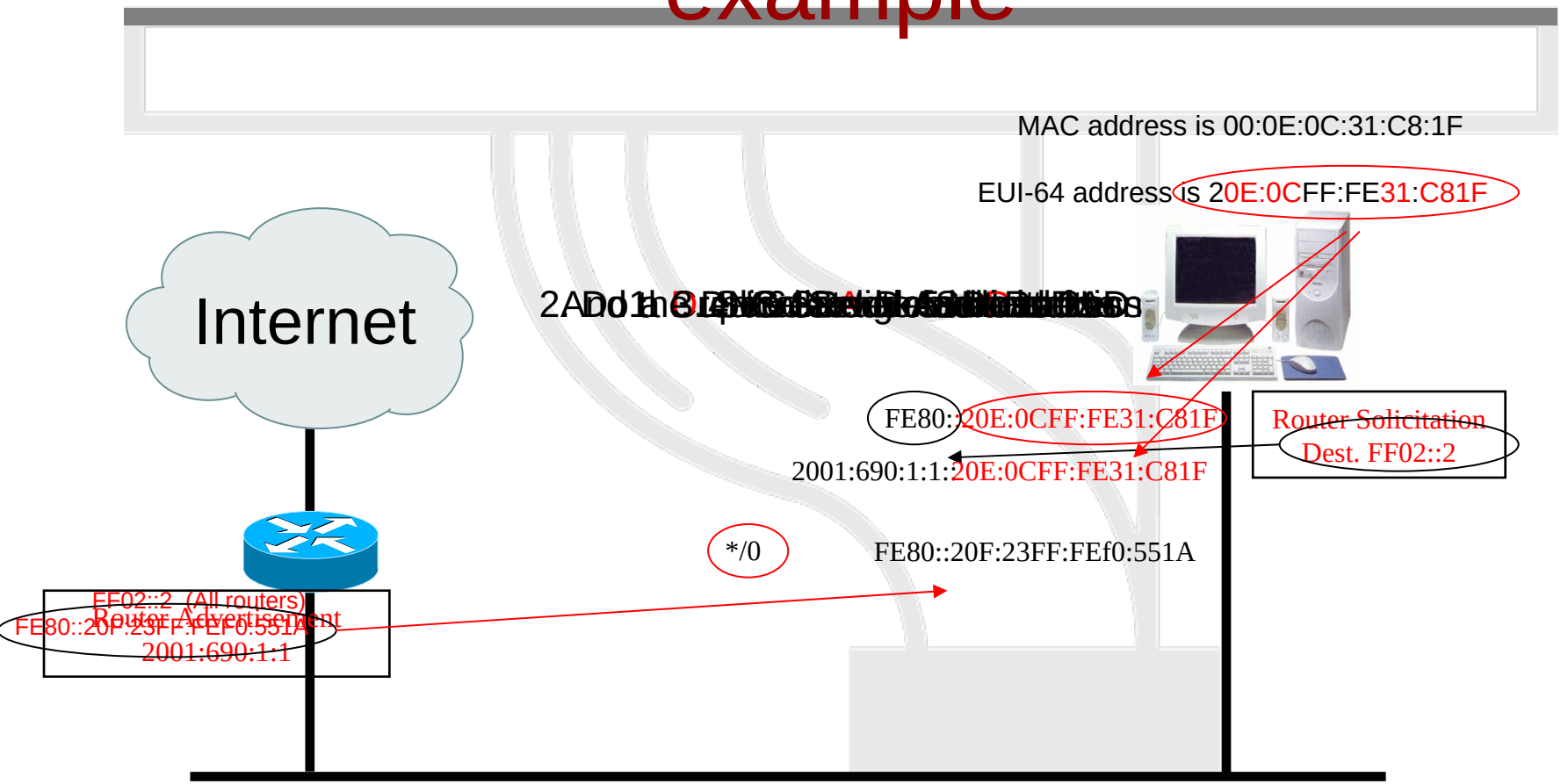
Stateless Autoconfiguration

- IPv6 Stateless Address Autoconfiguration (RFC 2462)
- Hosts listen 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
- Currently not possible to automatically send DNS server addresses in RAs
  - However there are some proposals under consideration
- 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 indicates use of DHCP

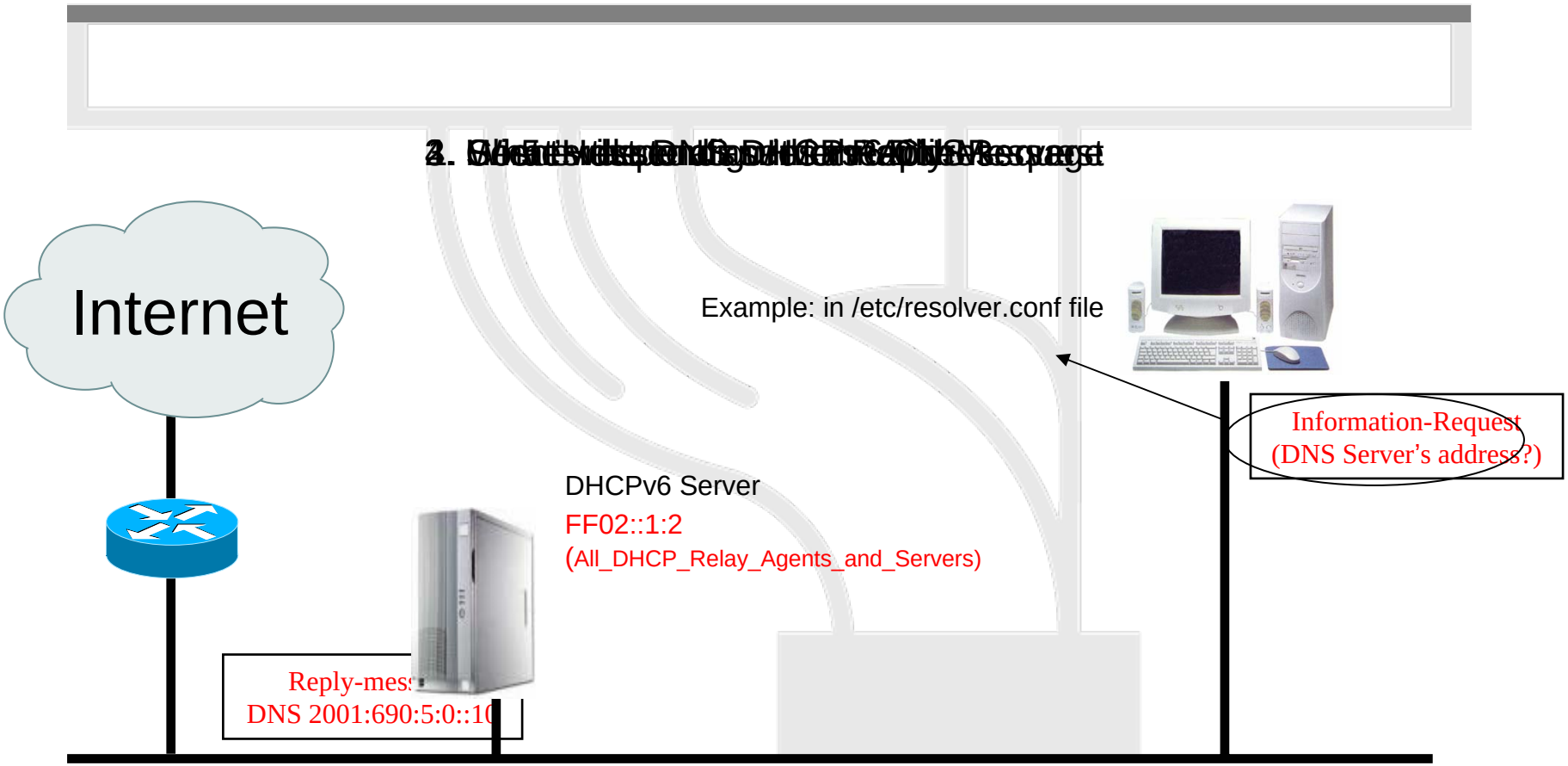
DHCPv6 Server

- 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

DHCPv6 Client and Relay

- 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 (optional)
  - 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 end systems
  - Windows 'Vista/Longhorn Server' supports DHCPv6

Questions?