
deploy
IPv6 Address autoconfiguration
stateless & stateful

Agenda

- Stateless Autoconfiguration
- Stateful Autoconfiguration (DHCPv6)
- Conclusions

Stateless Autoconfiguration

Provides plug & play networking for hosts

On network initialisation a node can obtain:

- IPv6 prefix(es)
- Default router address(es)
- Hop limit
- (link local) MTU
- validity lifetime

DNS server addresses are not normally supplied

- Though there is an experimental DNS extension (RFC5006)
  - Though not yet available in any OS

Stateless Autoconfiguration

Hosts can automatically get an IPv6 address

Only routers have to be manually configured

- Or can use the *Prefix Delegation* option (RFC 3633)

Servers should be manually configured

Link-local (as opposed to Global) addresses are usually autoconfigured on all nodes

Stateless Autoconfiguration

IPv6 Stateless Address Autoconfiguration

- Defined in RFC 4862

Hosts listen for Router Advertisements (RA) messages

- Periodically sent out by routers on the local link, or requested by the host using an RA using a solicitation message
- RA messages provide information to allow for automatic configuration

Hosts can create a Global unicast IPv6 address by combining:

- Its interface's EUI-64 (based on MAC) address or random ID
- Link Prefix (obtained via Router Advertisement)

Global Address = ***Link Prefix*** + ***EUI-64 address***

Stateless Autoconfiguration

Usually, the router sending the RA messages is the default router

If the RA doesn't carry a prefix

- The hosts don't configure (automatically) any global IPv6 address (but may configure the default gateway address)

RA messages contain two flags

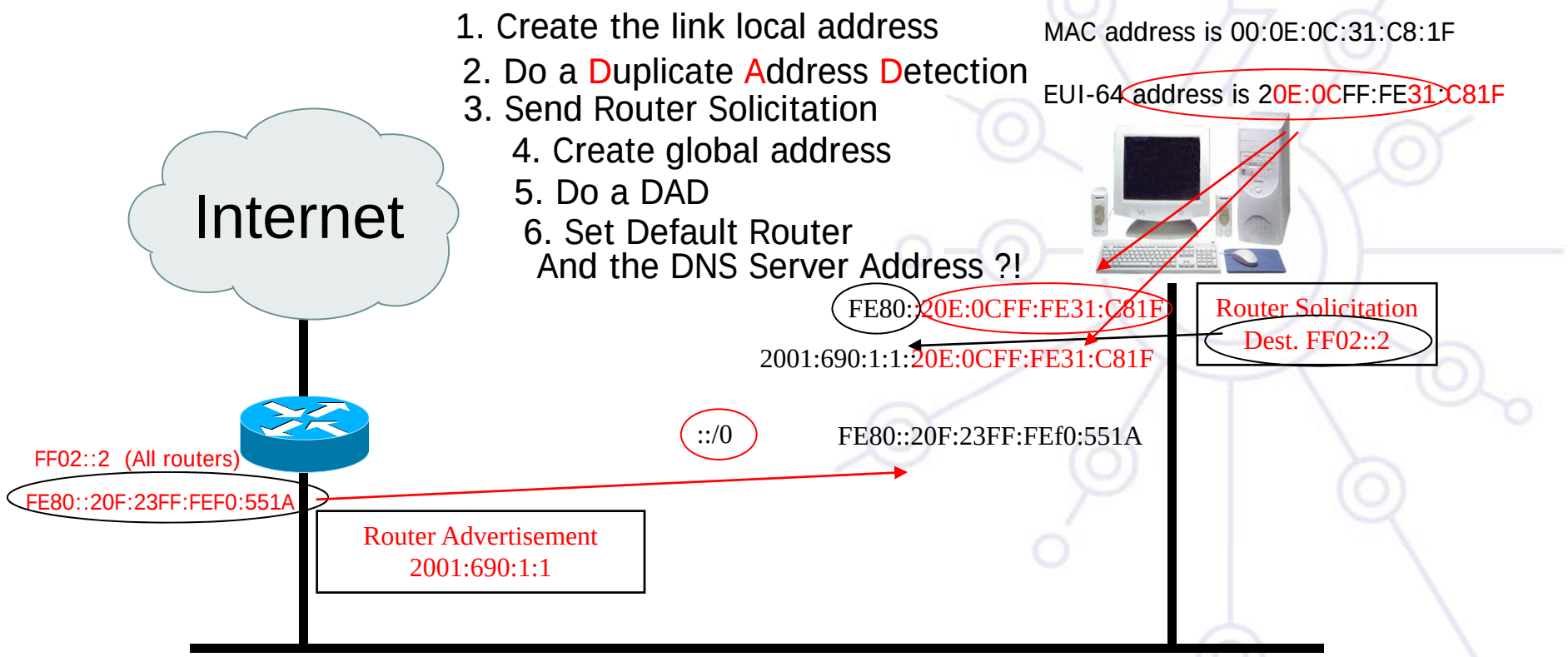
- Indicate what type of stateful autoconfiguration (if any) should be performed
  - Though the interpretation of ManagedFlag and OtherConfigFlag is currently a little ambiguous

IPv6 addresses usually based on NIC MAC address

- Though hosts can use Privacy Extensions (RFC4941)
  - E.g. Vista uses random EUI-64 as default

Stateless Autoconfiguration /2

1. Create the link local address
2. Do a Duplicate Address Detection
3. Send Router Solicitation
4. Create global address
5. Do a DAD
6. Set Default Router
   And the DNS Server Address ?!



Statefull Autoconfiguration DHCPv6

Dynamic Host Configuration Protocol for IPv6

- Defined in RFC 3315
- Stateful counterpart to IPv6 Stateless Address Autoconfiguration.

According to RFC 3315 DHCPv6 is used when:

- No router is found
- Or if Router Advertisement message enables use of DHCP
  - Using ManagedFlag and OtherConfigFlag

There is also ‘stateless DHCPv6’ (RFC3736)

- Used by clients that already have an address
- Based upon standard DHCPv6

Statefull Autoconfiguration DHCPv6 /2

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...)
  - Listens on the following multicast addresses:
    - All_DHCP_Relay_Agents_and_Servers (FF02::1:2)
    - All_DHCP_Servers (FF05::1:3)
  - Provides means for securing access control to network resources
  - Usually storing client's state, though 'stateless operation' is also possible (the usual method used for IPv4 today)

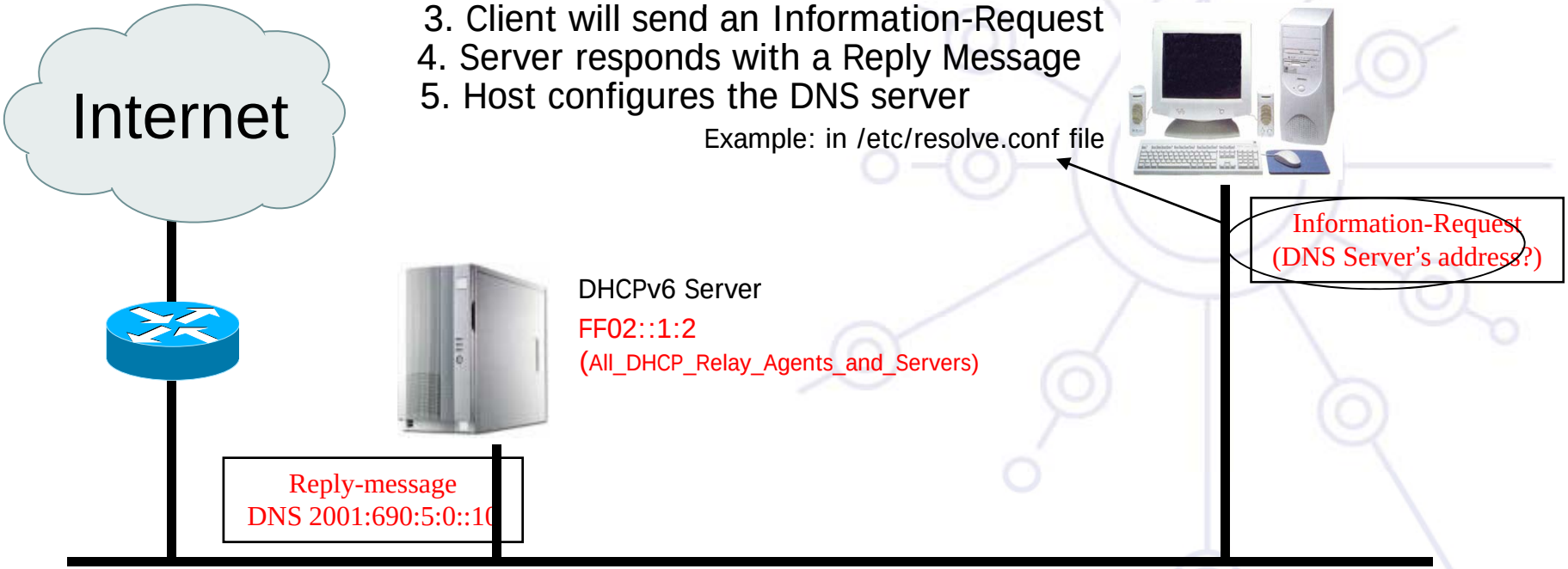
Statefull Autoconfiguration DHCPv6 /3

- Client
  - Initiates requests on a link to obtain configuration parameters
  - Uses its link local address to connect the server
  - Sends requests to FF02::1:2 multicast address (All_DHCP_Relay_Agents_and_Servers)
- Relay agent
  - A node that acts as an intermediary to deliver DHCP messages between clients and servers
  - On the same link as the client
  - Listens on multicast address:
    - All_DHCP_Relay_Agents_and_Servers (FF02::1:2)

Statefull Autoconfiguration
DHCPv6 /4

1. What's the DNS servers' Address
2. Host execute an DHCPv6 Client
3. Client will send an Information-Request
4. Server responds with a Reply Message
5. Host configures the DNS server

Example: in /etc/resolve.conf file



Conclusion

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 IPv4 DNS server addresses from DHCPv4

DHCPv6 clients not shipped in all Operating Systems

- Vista/Windows7 contains DHCPv6 client
- Third party clients are availble for all Oses
  - E.g. Dibbler, ISC DHCP, Red Hat DHCPv6


deploy
Questions ?