



6.5. DHCPv6

DHCPv6

(RFC3315 – RFC4361)

- DHCPv6 is a client-server-based UDP protocol designed to reduce the IPv6 nodes management cost in those environments whereby control of IPv6 address allocation is required and/or more control than the one provided by the stateless mechanism about the provision of network parameters is needed
- DHCP reduces the cost of ownership by centralizing the management of network resources such as IP addresses, routing information, OS installation information, directory service information, and other such information on a few DHCP servers, rather than distributing such information in local configuration files among each network node
- DHCPv6 provides a superset of features, and benefits from the additional features of IPv6 and freedom from BOOTP -backward compatibility constraints

Goals of DHCPv6

- DHCP is a mechanism rather than a policy. Network administrators set their administrative policies through the configuration parameters they place upon the DHCP servers in the DHCP domain they're managing. DHCP is simply used to deliver parameters according to that policy to each of the DHCP clients within the domain
- DHCP is compatible with IPv6 stateless autoconf
- DHCP does not require manual configuration of network parameters on DHCP clients, except in cases where such configuration is needed for security reasons. A node configuring itself using DHCP should require no user intervention
- DHCP does not require a server on each link. To allow for scale and economy, DHCP must work across DHCP relays
- DHCP coexists with statically configured, non-participating nodes and with existing network protocol implementations
- DHCP clients can operate on a link without IPv6 routers present
- DHCP will provide the ability to renumber network(s) when required by network administrators
- A DHCP client can make multiple, different requests for configuration parameters when necessary from one or more DHCP servers at any time
- DHCP will contain the appropriate time out and retransmission mechanisms to efficiently operate in environments with high latency and low bandwidth characteristics

DHCPv6 Details

- UDP ports are
 - Clients listens to 546
 - Server and relays listen to 547
- Address for DHCPv6 relay agent and servers
 - FF02::1:2 (link local scope)
 - FF05::1:3 (site scope only for servers)
- DHCP messages
 - SOLICIT
 - ADVERTISE
 - REQUES
 - CONFIRM
 - RENEW
 - REBIND
 - REPLY
 - RELEASE
 - DECLINE
 - RECONFIGURE
 - INFORMATION-REQUEST
 - RELAY-FORW
 - RELAY-REPL
- Each message can carry one or more DHCP options
 - Domain-list
 - DNS-server
 - IA-NA, etc.
- DHCP Unique Identifier (DUID)
 - servers use DUIDs to identify clients for the selection of configuration parameters and in the association of IAs with clients
 - clients use DUIDs to identify a server in messages where a server needs to be identified

Basic DHCPv6 Example

client



server



SOLICIT (FF02::1:2)

ADVERTISE

REQUEST/RENEW

REPLY

client



relay



server



SOLICIT (FF02::1:2)

ADVERTISE

REQUEST/RENEW

REPLY

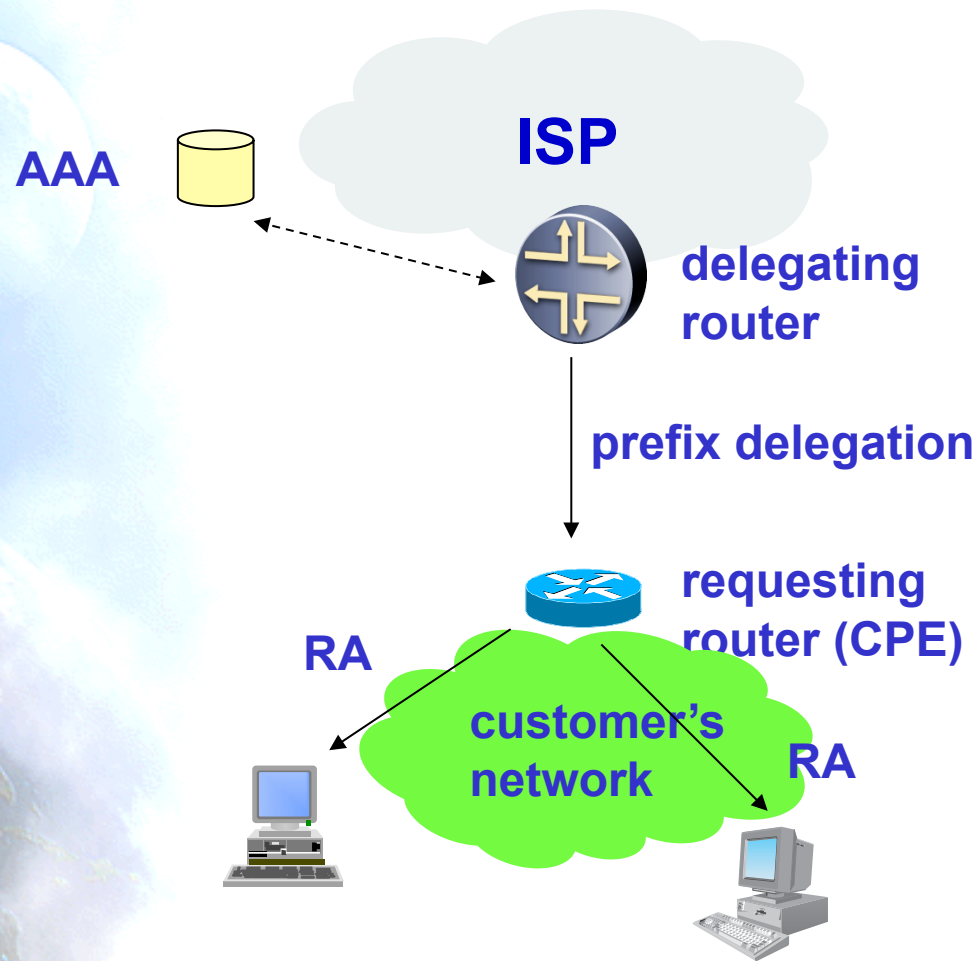
DHCPv6-PD (RFC3633)

- It provides an automated mechanism for the delegation of IPv6 prefixes to authorized requesting routers
- Delegating router does not require knowledge about the topology of the networks to which the requesting router is attached
- Delegating router does not require other information aside from the identity of the requesting router to choose a prefix for delegation
 - for example a ISP to assign a prefix to a CPE device acting as a router

DHCPv6 Details

- Requesting router (RR) authentication is needed
- Profile for a RR could be stored in AAA server
- Delegated prefix could be gotten from either:
 - the customer's profile stored in the AAA server
 - prefix pool
- The delegated prefixes have lifetime as IPv6 address in DHCPv6
- DHCPv6-PD doesn't provide a way to propagate the delegated prefix through the customer's network
 - `::/64` prefixes from the delegated prefix are assigned in the RR according to the configured policy
- DHCPv6 relay agents could also be used as in DHCPv6

Network architecture for DHCPv6-PD



Basic DHCPv6-PD Example

client



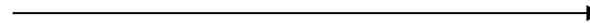
requesting router



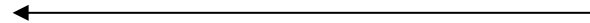
delegating router



SOLICIT (FF02::1:2, IA-PD)



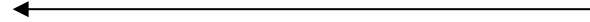
ADVERTISE



REQUEST/RENEW



REPLY (prefix)



Router Advertisement



New User Features with DHCPv6

- Configuration of Dynamic Updates to DNS.
- Address deprecation, for dynamic renumbering.
- Relays can be preconfigured with server addresses, or use of multicast.
- Authentication.
- Clients can ask for multiple IP addresses.
- Addresses can be reclaimed using the Reconfigure-init message.
- Integration between stateless and stateful address autoconfiguration.
- Enabling relays to locate off-link servers.