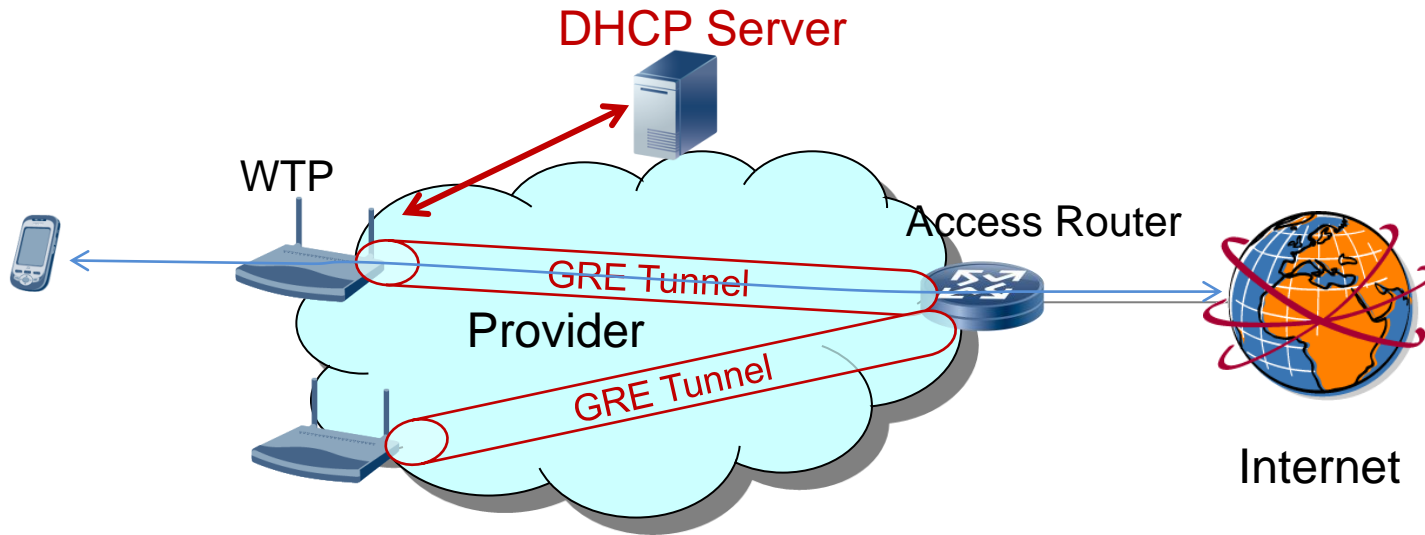# DHCP for Dynamic GRE Tunnel

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Use Cases

- **In MSO or mobile hotspot WLAN scenario, the GRE tunnels SHOULD be deployed between WTP and Access Router to carry user data (http://tools.ietf.org/html/draft-ietf-opsawg-capwap-alt-tunnel-00).**

- **Auto-configuration or dynamic solution is required to configure the WTPs with the parameters needed for GRE tunnel establishment, such as AR address, especially there are a large number of WTPs.**

- **DHCP options are extended to notify the specific Access Router address to WTP.**
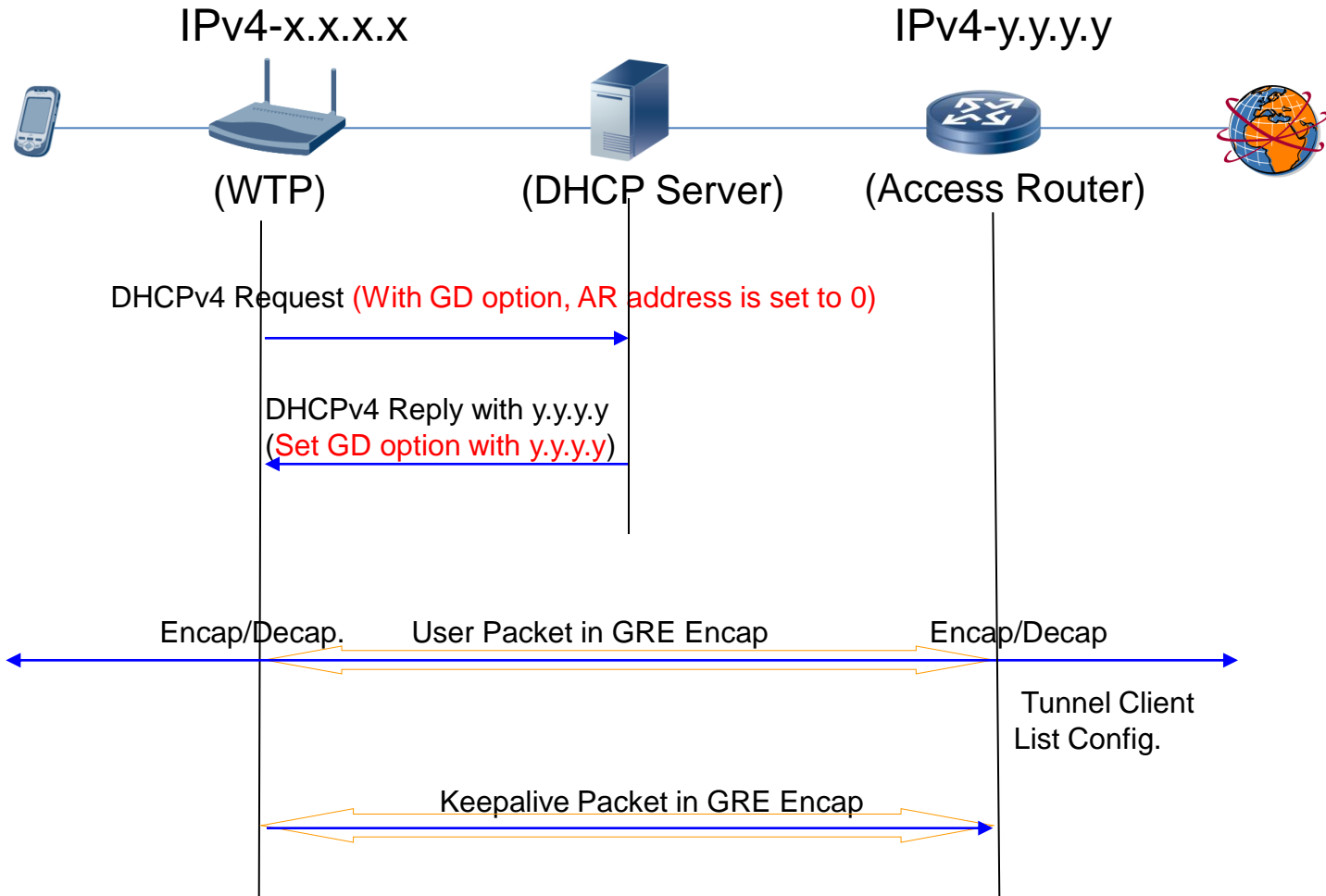
Dynamic GRE Tunnel

- **WTP discovers AR**
  - To set up a GRE tunnel, a WTP sends a DHCP Request to DHCP server to obtain the AR address and other tunnel parameters such as GRE Key, etc.
  - DHCP Server replies the DHCP Reply to WTP with AR address.
  - The DHCP GRE Discovery (GD) Option is defined in following page.
- **GRE Tunnel Establishment Phase**
  - For WTP, The GRE tunnel is set up after receiving DHCP Reply with DHCP GD Option.
  - AR can discover WTP via the received GRE encapsulated packet from WTP. Generally, WTP can encapsulate UE's first packet with GRE, no matter data packet or control packet.
  - Then the GRE tunnel information, IP address of WTP is checked and restored as destination of GRE tunnel on AR side.

An Illustration of DHCP Procedure

IPv4-x.x.x.x   IPv4-y.y.y.y

(WTP)   (DHCP Server)   (Access Router)

Preliminary Phase (Discovery)

DHCPv4 Request (With GD option, AR address is set to 0)

DHCPv4 Reply with y.y.y.y
(Set GD option with y.y.y.y)

Establishment Phase

Encap/Decap.   User Packet in GRE Encap   Encap/Decap
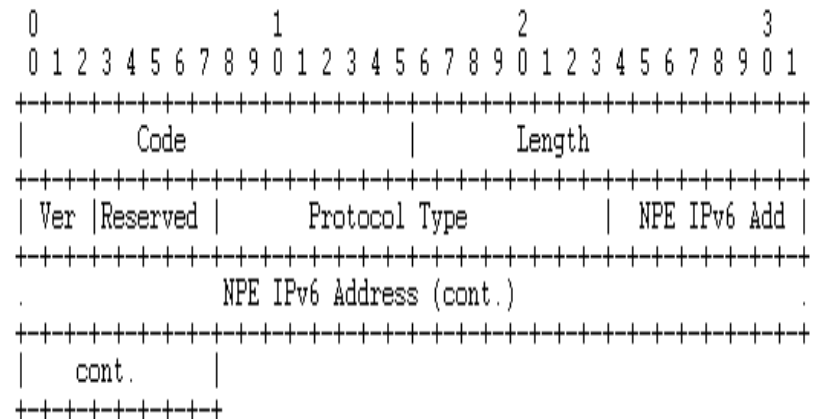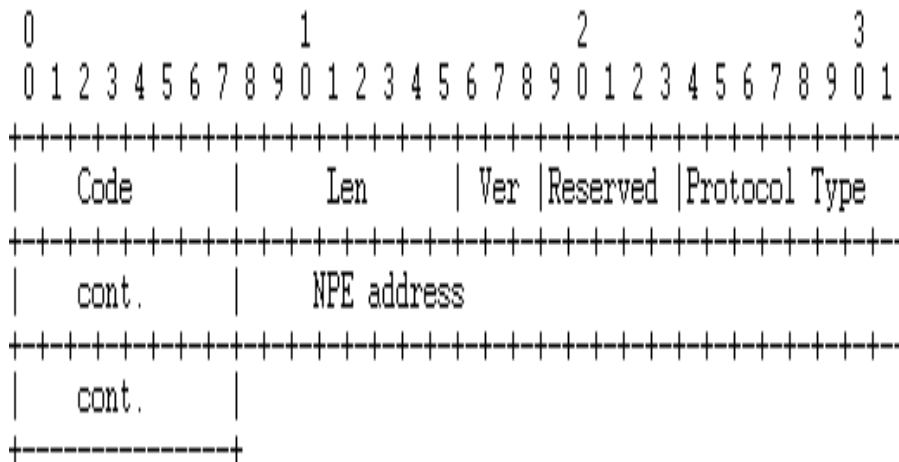
Tunnel Client List Config.

Keepalive Phase

Keepalive Packet in GRE Encap

Dynamic GRE Tunnel in MSO WLAN Network

DHCP Options Extension

- ***DHCPv4 GRE Discovery Option :*** AR IPv4 address
- ***DHCPv6 GRE Discovery Option :*** AR IPv6 address
  - ***Ver:*** The version number contained in GER header.
  - ***Reserved:*** This field is reserved for future use.
  - ***Protocol Type:*** The Protocol Type Field contains the protocol type of the payload packet.
  - ***NPE Address:*** AR IPv4/IPv6 Address, the endpoint of GRE tunnel.

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Code        |     Len       | Ver |Reserved |Protocol Type  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   cont.       |    NPE address                                |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   cont.       |
+-+-+-+-+-+-+-+-+
```

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|            Code               |            Length             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Ver |Reserved |     Protocol Type           |  NPE IPv6 Add  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
.            NPE IPv6 Address (cont.)                           .
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   cont.       |
+-+-+-+-+-+-+-+-+
```

Any comment?
Thank You!