IPv6 Transition Technologies Selection using DHCP/DHCPv6

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Problem Description-1

- Nowadays, many IPv6 transitioning technologies have been proposed , such as Dual-Stack, DS-Lite, 6rd and so on. Each of them proposes individual requirement to the CPE.
- One CPE may support several IPv6 transition technologies.

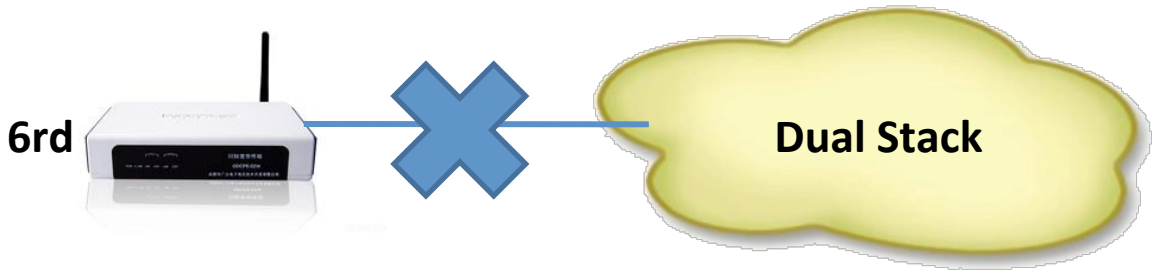
We can buy a CPE from electronic market supporting some technologies combination:

1. Dual-Stack, 6RD
2. DS-Lite, Dual-Stack
3. … …

- We consider that is a good news, because the provider could deploy IPv6 in more flexibility with one type of CPE.
- But the question is, **how does the provider or the customer configure the CPE using the proper transition technology?**

Problem Description-2

- By now, there are two ways to make the CPEs available. But the access is at risk.
  - ① Provider pre-configure the CPE before giving them to the customers
    - The potential problems is :
    - **If users modify the configuration, or replace the equipment, the connection may fail**



e.g.
Network is configured in Dual-Stack, if a subscriber use a 6rd CPE, he could not access internet.

We have found this issue in the IPv6 trials, and we consider it must be more serious in the commercial IPv6 network.
If many customers do not satisfy with the CPE from provider and replace with another one, which often occur in IPv4, does the provider have enough operators to solve the problem one by one in their houses?

Problem Description-3

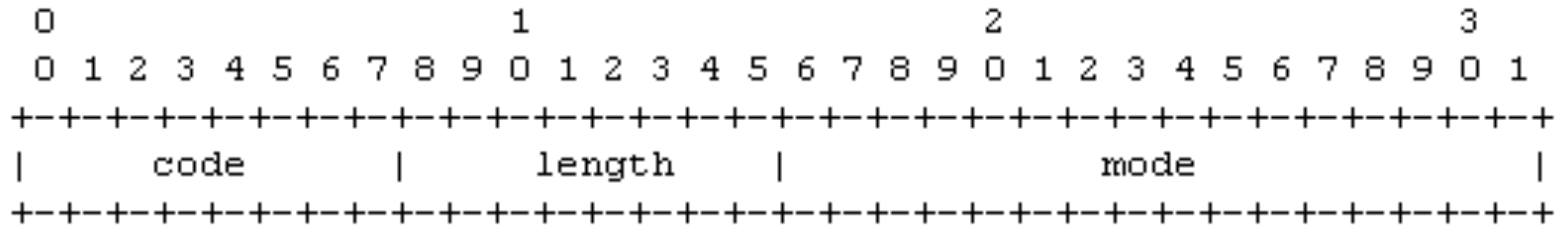
② The 2nd solution is using remote control systems, such as CPE management systems.

- By now, various CPEs from different manufactories usually need different remote control systems, that means the provider needs to maintains multiple management systems in their network, or provider can only use one manufacturer's product in a subnet.

- But unfortunately, except for the increasing CAPEX, the potential problems still exit :
- **If users replace the equipment, the connection may fail**

Solution: new option in DHCP & DHCPv6

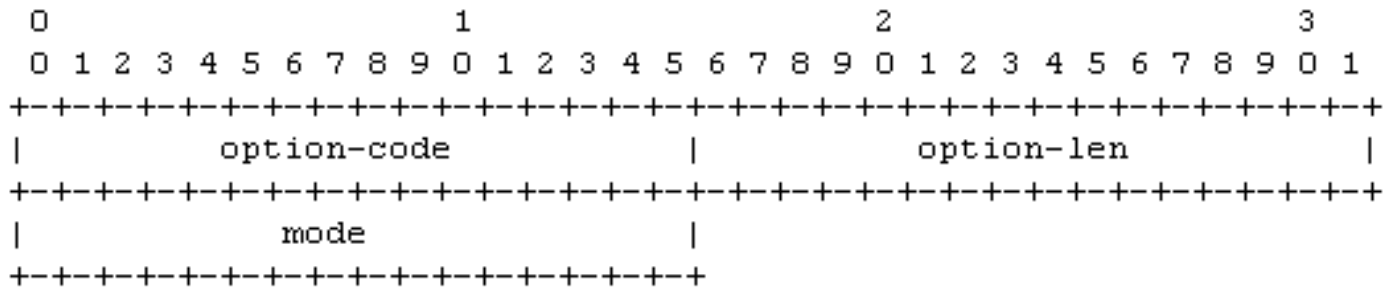
- A new option named OPTION_TRAN_TYPE is defined in DHCP.



- **When SR/BRAS allocate IPv4 address or other parameters for the CPEs, it tells them which IPv6 transition technology to choose in the new defined option.**
- CPE MUST send Request message with OPTION_TRAN_TYPE option code in option55[Parameter Request List, RFC2131,section 9.8] to Server.
- A server MAY include a TRAN_TYPE option in any DHCP message to control the transition strategy selection of the CPE, including Discover, Offer, Request, Reply, and Inform Messages.
- The server can also send the OPTION_TRA_TYPE option in Offer Message or ACK Message directly **without the request OPTION code in Discover or Request Message from CPE**.

New Option in DHCPv6

- A new option named OPTION_TRAN_TYPE is defined.



  - **The mechanism is same as that in DHCP.**
  - CPE MUST send Request message with OPTION_TRAN_TYPE option code in Option Request Option [RFC3115,section 22.7] to Server.
  - A server MAY include a TRAN_TYPE option in any DHCPv6 message to control the transition strategy selection of the CPE, including Solicit, Advertise, Request, Confirm, Renew, Rebind, Information- Request Messages.
  - The server can also send the OPTION_TRA_TYPE option in Advertise Message or Confirm Message directly **without the request OPTION in Solicit or Request Message from CPE.**

Definition of ‘Mode’ field

- To avoid OPTION_TRAN_TYPE meanings ambiguity, the 'mode' field must **be consistent in any CPE and server.**
- The list of all the transition technologies must be defined by IANA or other organizations. For example, the 'mode' field list is set as below.

mode	transition tech.
0	Dual Stack
1	DS-Lite
2	... ...

Further Questions

- 1. If there is a DHCP/DHCPv6 Relay between the CPE and server, it must forward the messages including this option transparently.

- 2. Why choose DHCP and DHCPv6 to take this important option, not just one of them?
  - Because some of the transition technologies use only IPv4 or IPv6 in the CPEs' WAN interface. Obviously, 6rd use only IPv4, and DS_Lite use only IPv6.

- 3. Although DHCP/DHCPv6 must be used in IPoE scenario, it may not be launched in PPPoE network, which is a popular protocol in the fixed access networks. Then we must use other solutions to solve this problem.

- 4. The new option we proposed is to tell CE which transition technology to choose , not to configure one of the technologies, such as option64 in DS-Lite. Those are two issues in different level.

Thank you!