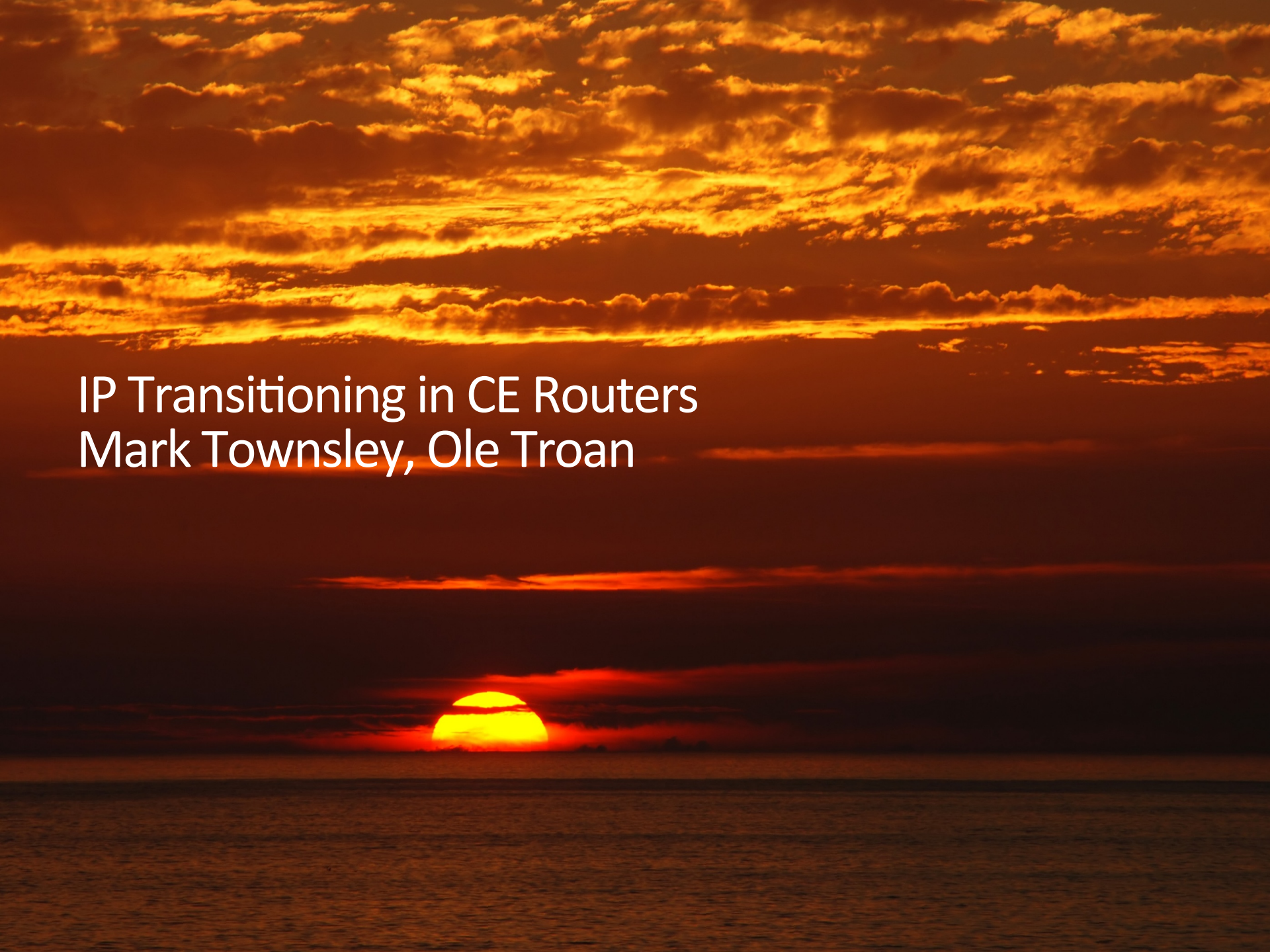
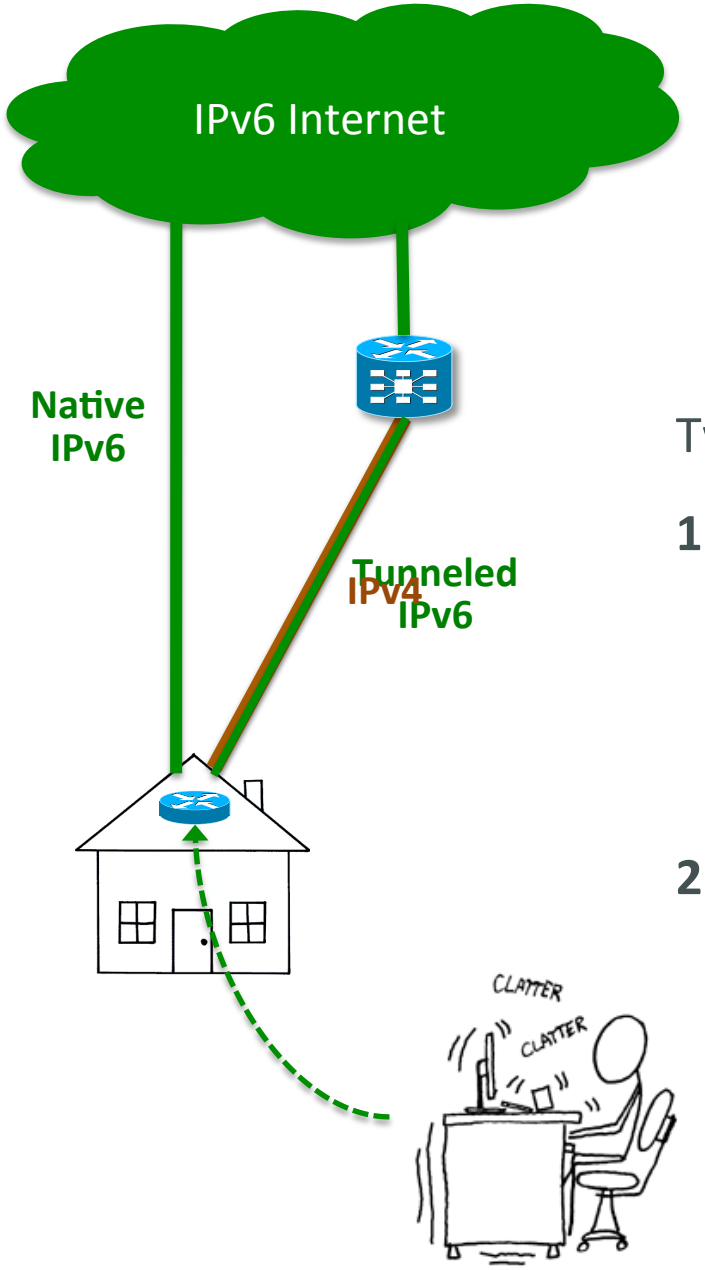


IP Transitioning in CE Routers

Mark Townsley, Ole Troan

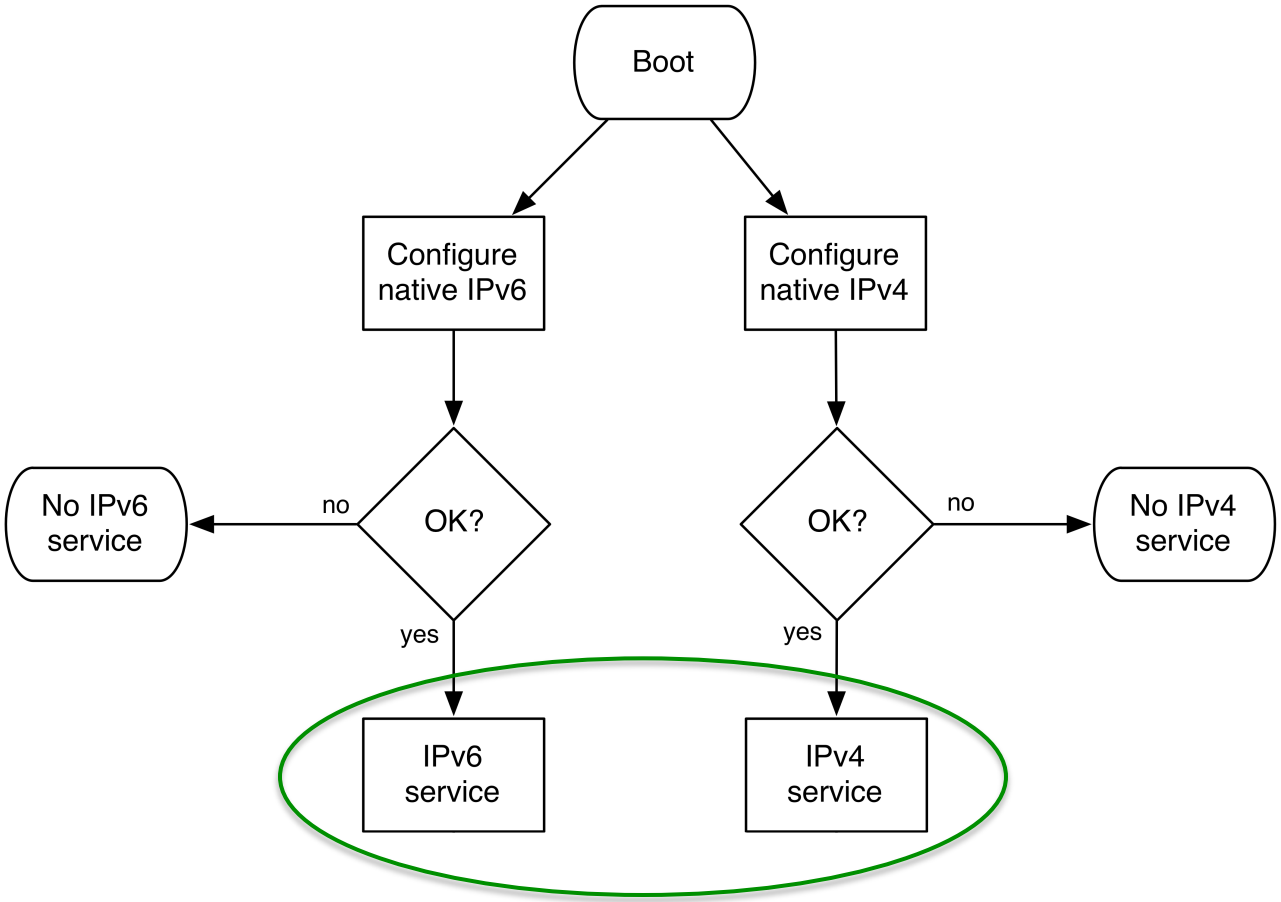
6rd



Two Choices:

1. **Multihoming:** Multiple active interfaces are allowed, router decides which WAN interface to use for upstream traffic based on IP forwarding metrics
2. **Forced single-homing**: Router is "allowed" one and only one active WAN interface at any time

Parallel Dual-Stack IP Config

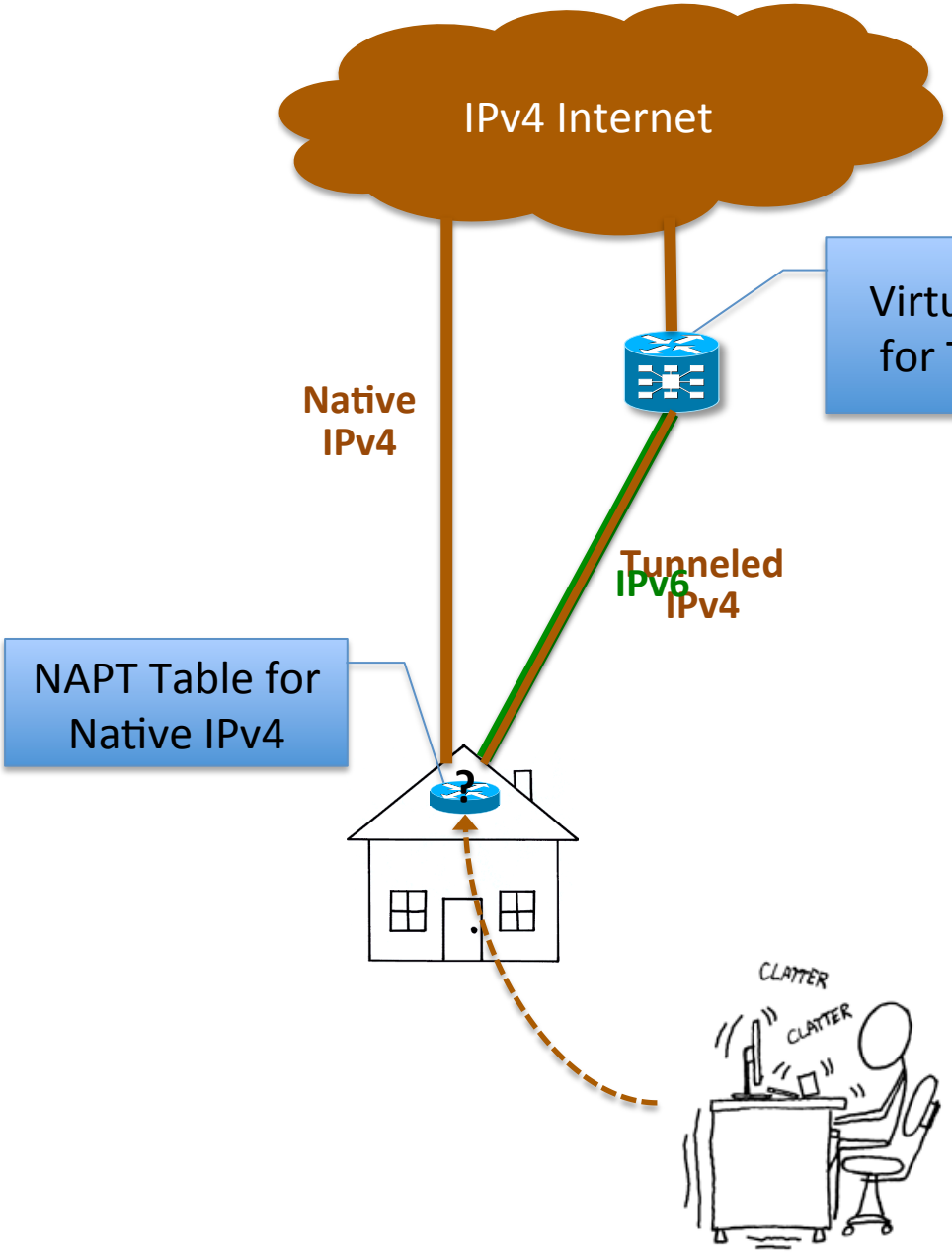


Requirements for IPv6 Multihoming and 6rd Sunsetting

1) The CE router MUST associate delegated prefixes with the WAN interface(s) they were learned from (e.g., DHCPv6-PD, 6rd, etc). Each packet sent out a WAN interface MUST have a source address that corresponds to a delegated prefix associated with the given WAN interface.

2) The IPv6 CE router MUST allow different or identical delegated prefixes on 6rd and native interfaces. By default, a 6rd virtual interface MUST be assigned a higher routing cost than a native IPv6 interface.

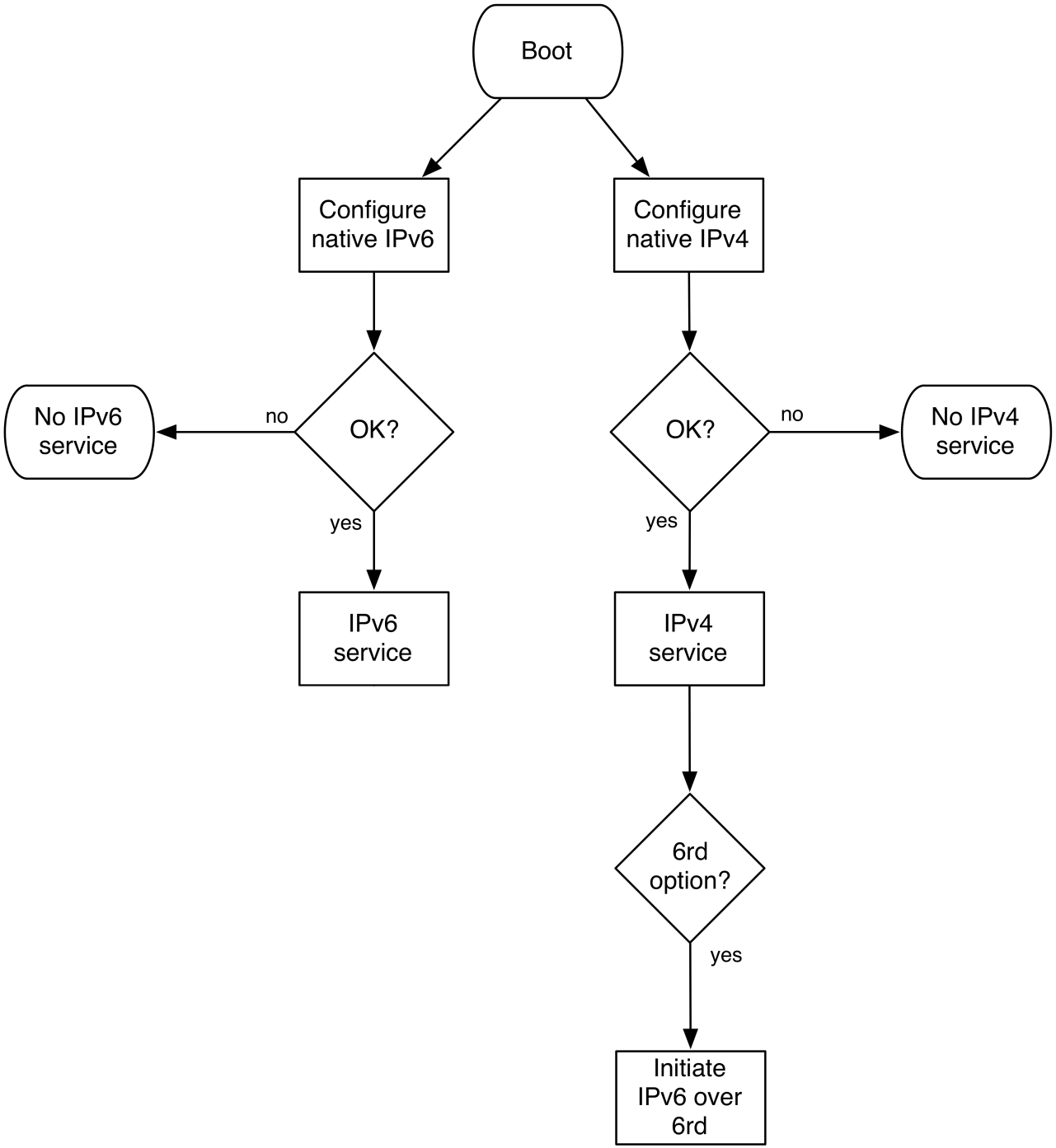
DS-Lite



Same Two Choices:

1. **Multihoming**
2. **Forced single-homing**

Parallel Dual-Stack IP Config



Load Balance Broadband Router
TL-R470T+

Google product search tp-link dual wan

TP-Link TL-R470T+ Dual Wan Load Balance Broadband Router

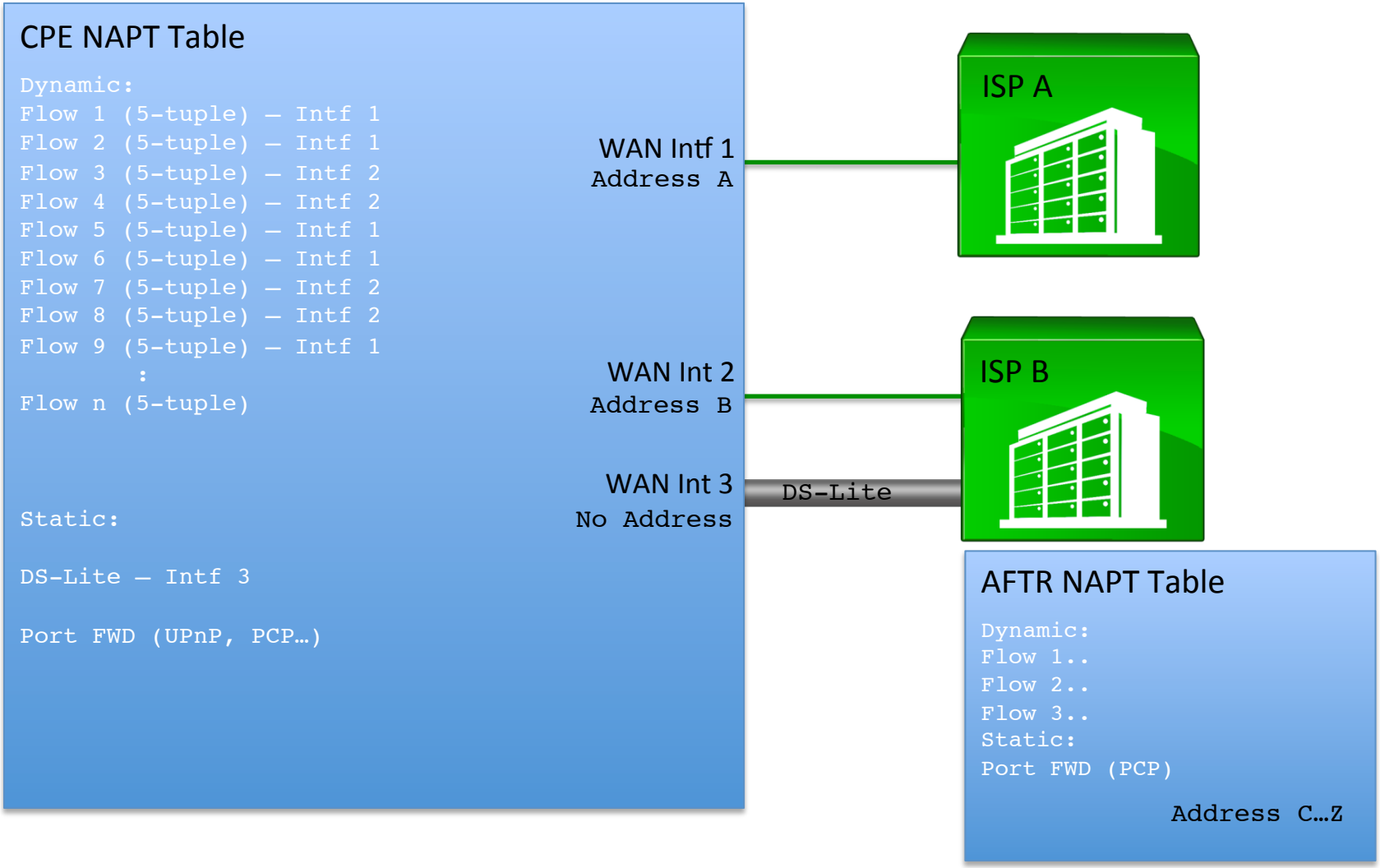
$43 online

+1 +1 Recommend this on Google

TL-R470T+ by TP-LINK (Factory New) The TL-R470T+ Load Balance Broadband Router possesses stronger data transmission capacity and stability, cost-efficient for networks in places such as Internet cafes and small oces. It brings you high return on investment with low overhead. Management: QoS, Web-based Management, Remote Web Management, DHCP.

http://tplink.com/en/products/details/?categoryid=227&model=TL-R470T%2b

IPv4 Forwarding w/Multiple Exits (one example)



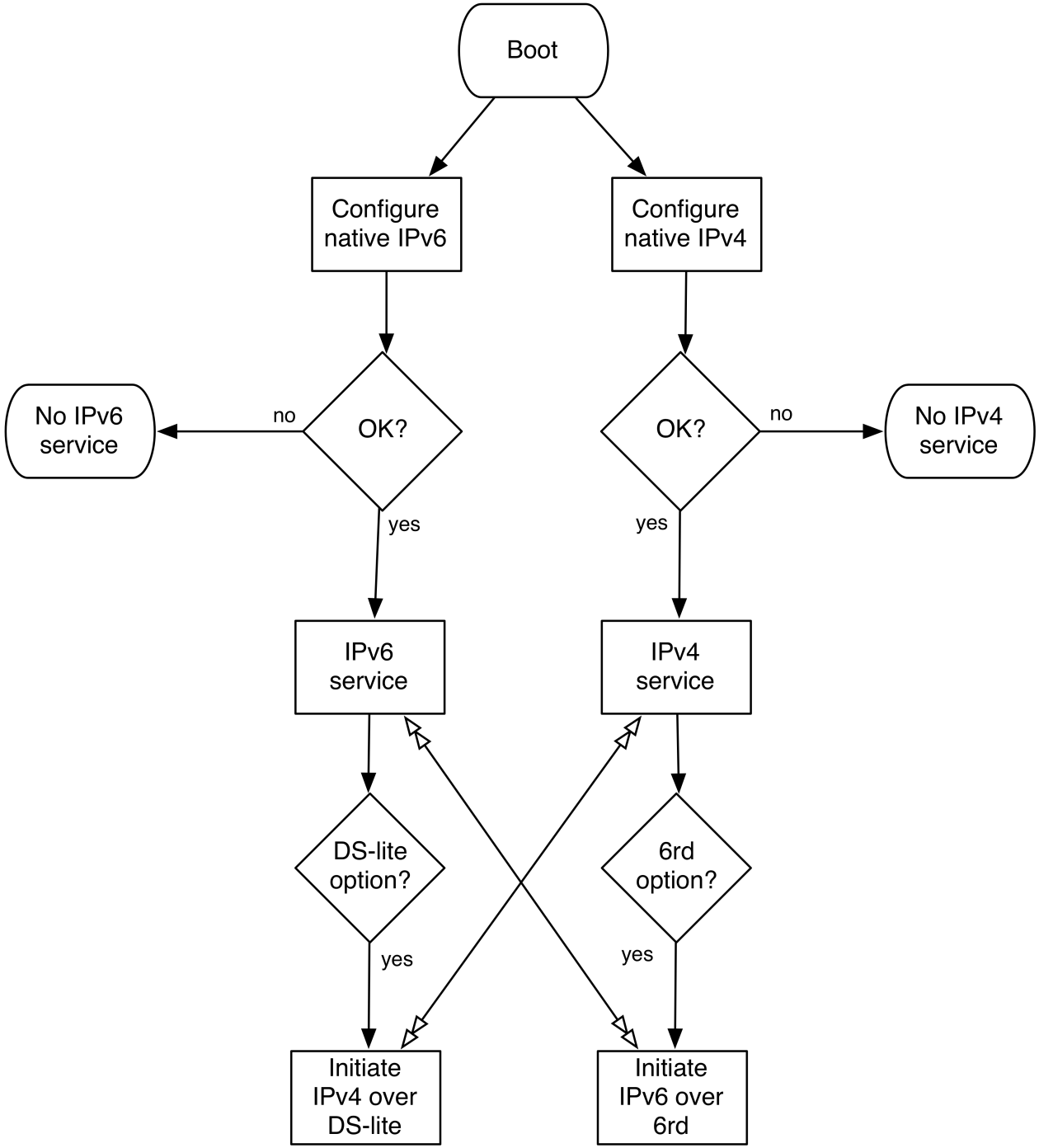
Example IPv4 Forwarding Policy for Transition

1. IPv4 over IPv6 transport is preferred over others
2. Less address translation occurrences is preferred over more [RFC5864][I-D.donley-nat444-impacts]
3. The closer the state is to the edge, the better. [RFC1958]

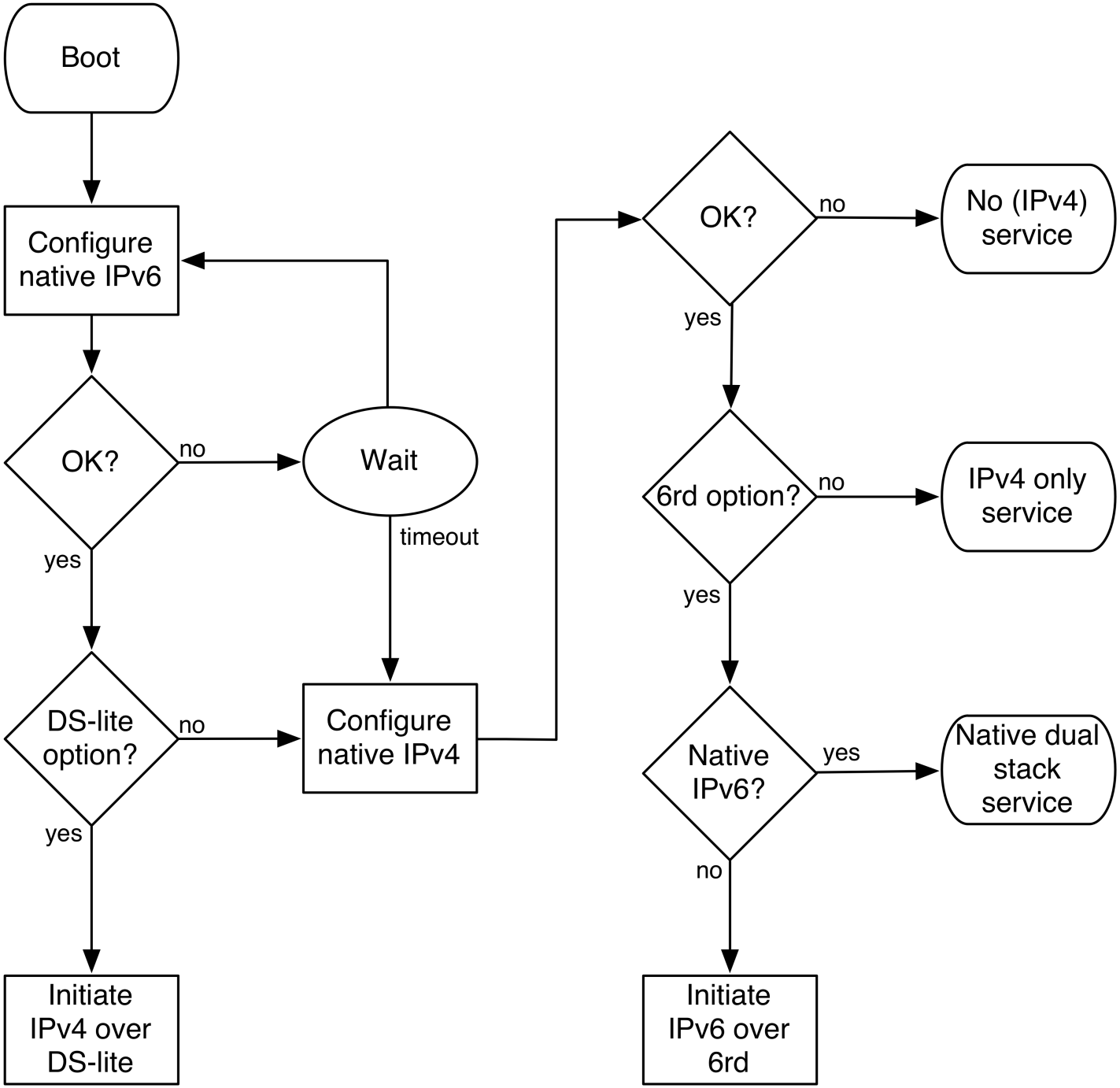
Mechanism	#1 (100)	#2 (10)	#3 (1)	Total
CGN	1	1	1	111
SD-NAT	1	1	2	112
Native IPv4	1	2	2	122
MAP-T	2	1	2	212
DS-lite	2	2	1	221
MAP-E	2	2	2	222

Table 1: IPv4 Preference Table

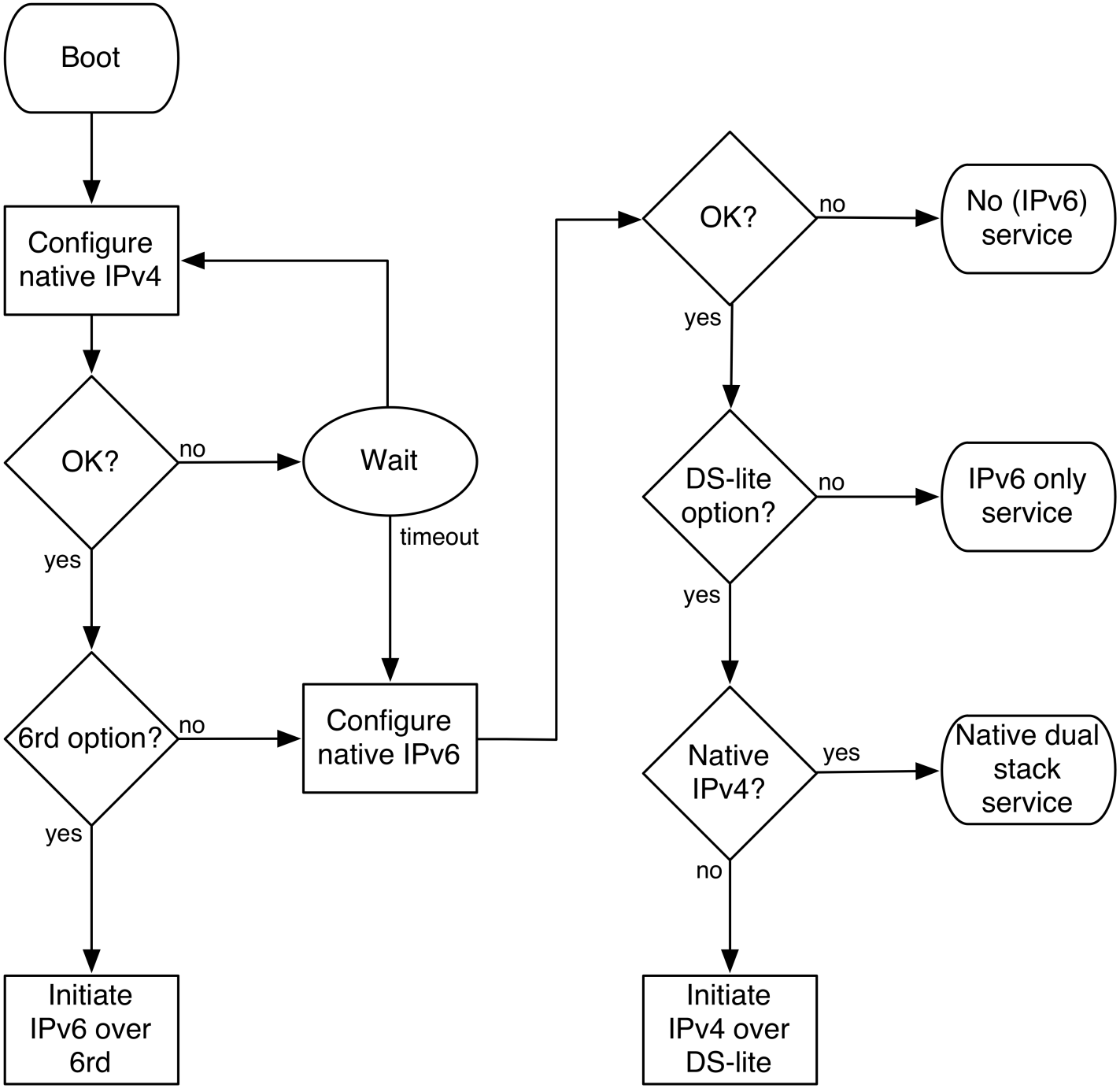
Forcing Single-Homing

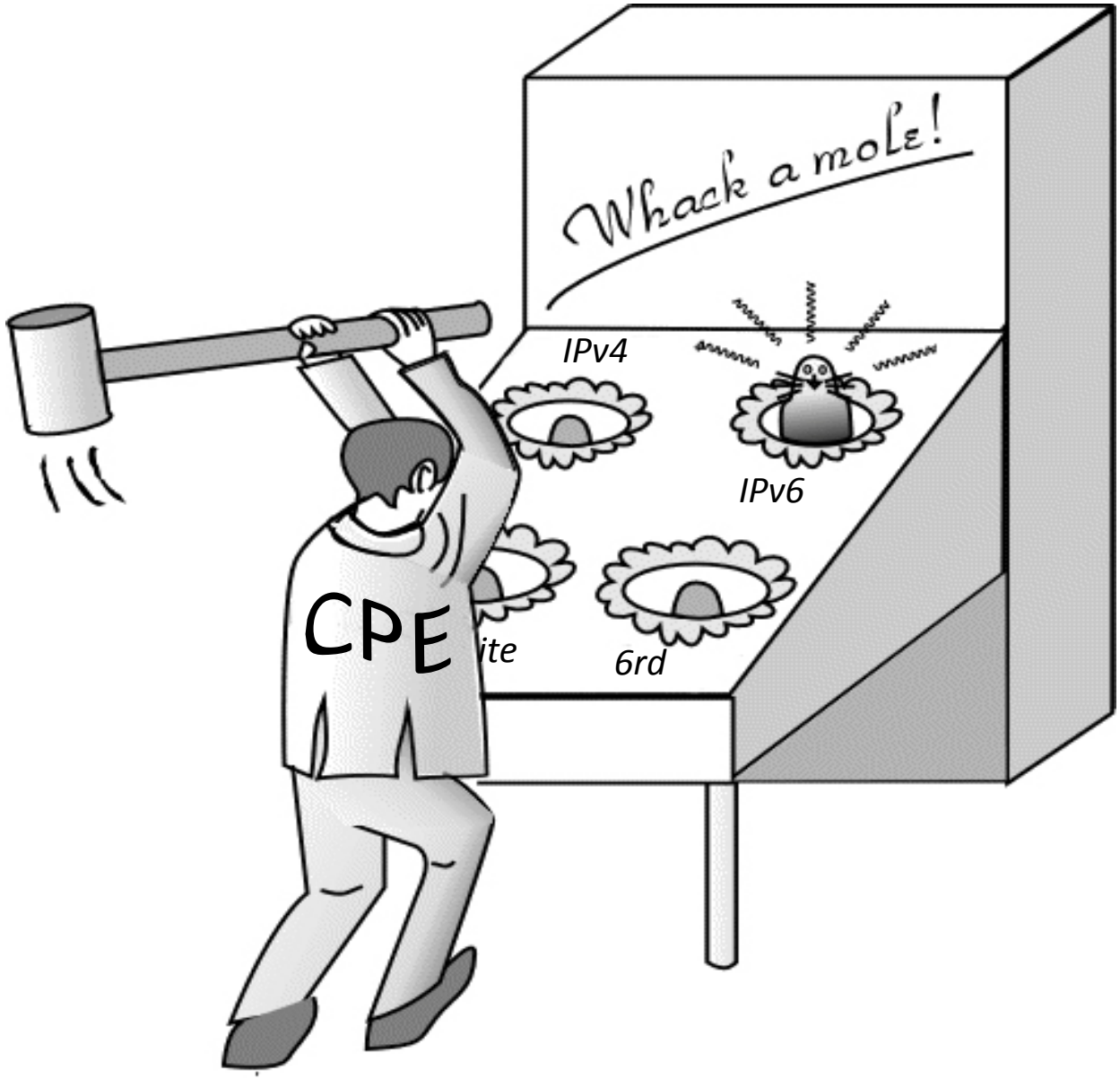


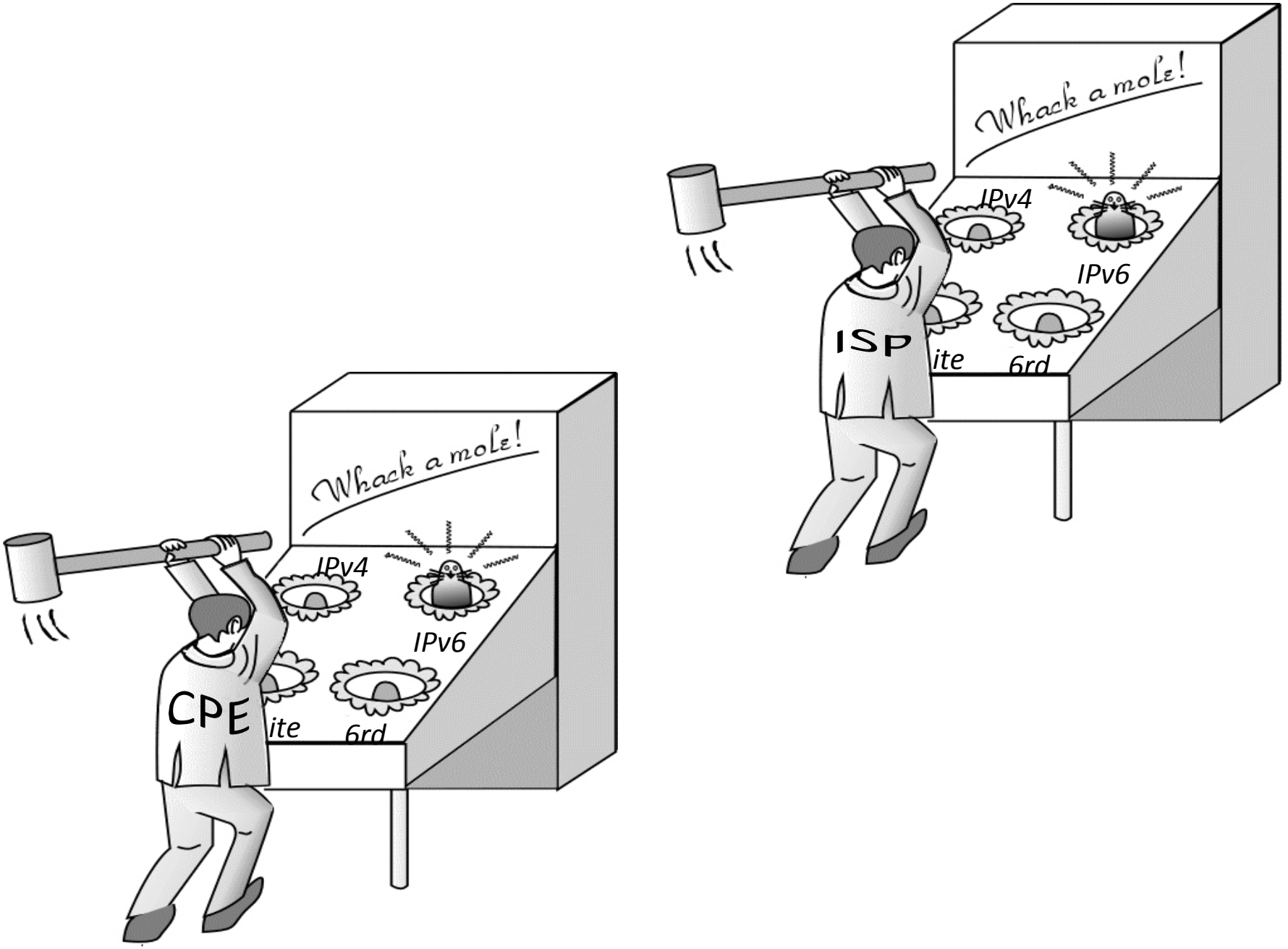
Forced Singlehoming (2)



Forced Singlehoming (3)




Whack a mole!
IPv4
IPv6
CPE
ite
6rd


Whack a mole!
IPv4
IPv6
ISP
ite
6rd
Whack a mole!
IPv4
IPv6
CPE
ite
6rd

What for 6204-bis?

Current text states CE Routers SHOULD implement DS-Lite and 6rd, but avoids how they interact with one another as well as with Native IPv4 and Native IPv6.

Two choices:

1. Specify in the "Transition" section that IP interface configuration operate independently

In order to support Multihoming:

- **For 6rd:** Include the two requirements in this presentation
- **For DS-Lite:** Require that IPv4 "dual-wan" functionality be employed. If we want to transition to IPv6, define a default policy for IPv4 mechanisms.

2. Or, move the "Transitioning" solution space to a new document.