What's New Regarding IPv6 Transition ?

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Transition & Coexistence Techniques

- IPv6 has been designed for easing the transition and coexistence with IPv4
- Several strategies have been designed and implemented for coexisting with IPv4 hosts, grouped in three categories:
  - Dual stack: Simultaneous support for both IPv4 and IPv6 stacks
  - Tunnels: IPv6 packets encapsulated in IPv4 ones
    - This has been the commonest choice … till now !
    - Today expect IPv4 packets in IPv6 ones!
  - Translation: Communication of IPv4-only and IPv6-only. Initially discouraged and only “last resort” (imperfect). Today no other choice!
- Expect to use them in combination!

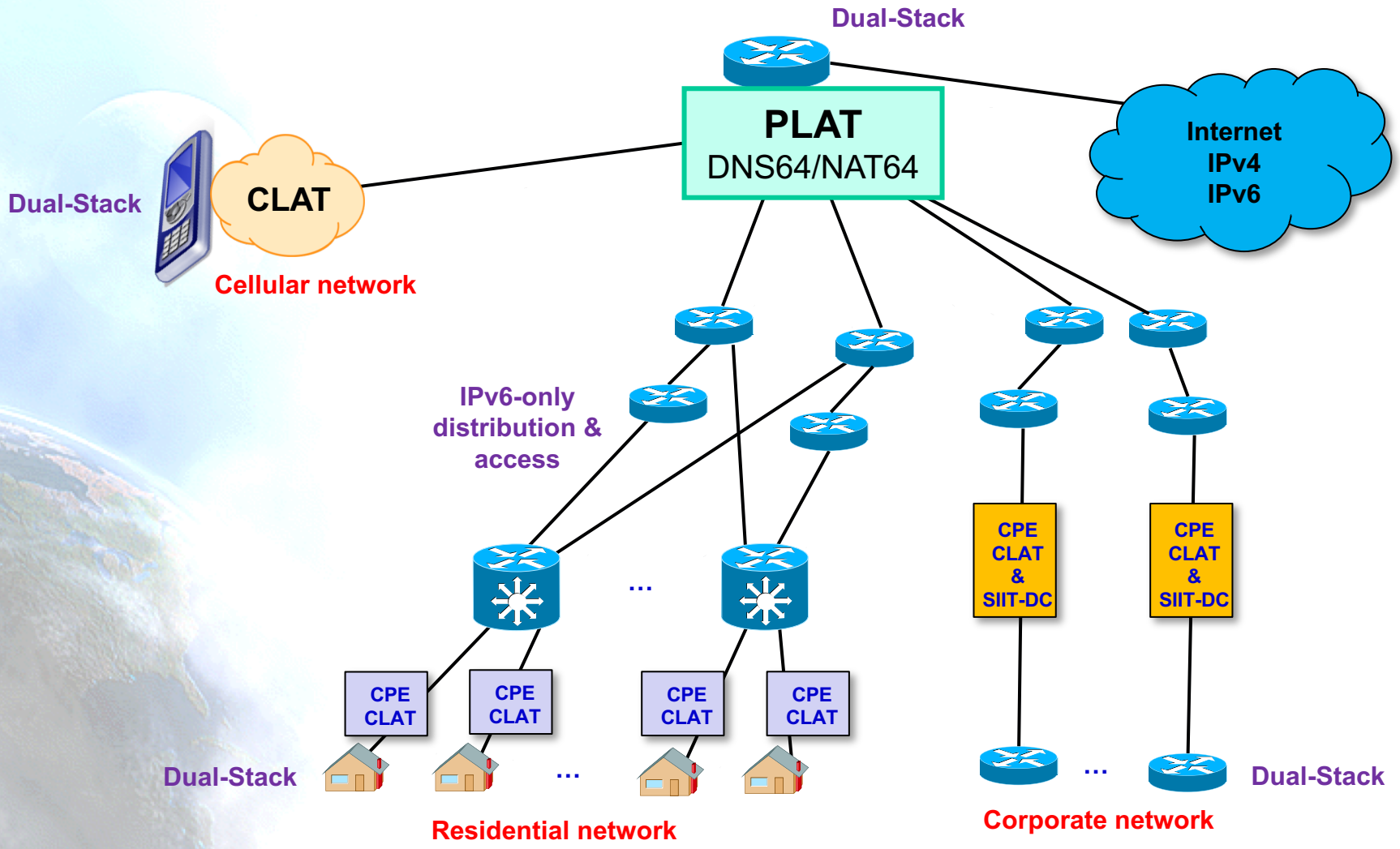
We Are Late !
So, let's "IPv6-only" !

- We don't have anymore IPv4 addresses
- We can't, generally, use IPv6-in-IPv4 tunnels
- We need to use mechanisms that rely on IPv6-only in the access network:
  - 464XLAT
  - DS-Lite
  - Lw4o6
  - MAP-E
  - MAP-T
- 464XLAT is already the winner in terms of number of users
  - Millions of cellular users
  - Also in wired-broadband

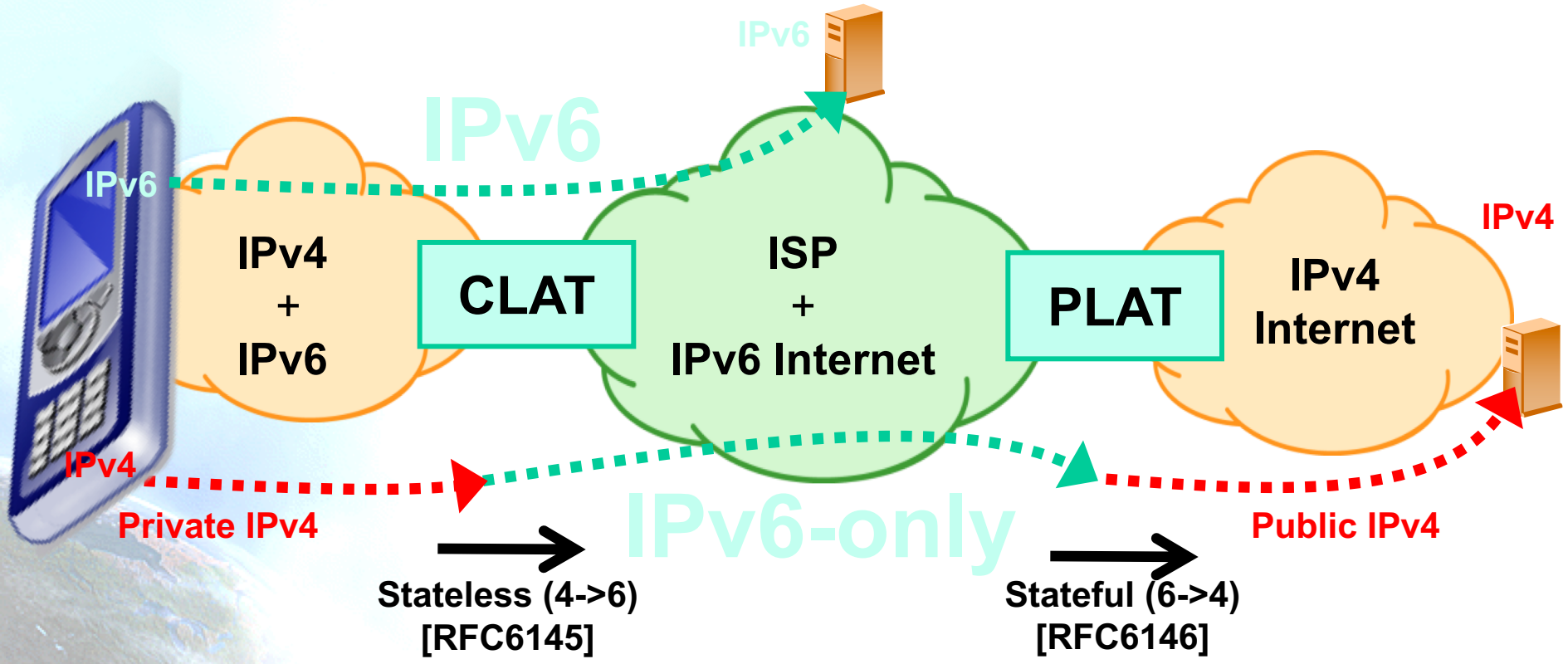
How Two “IPv6-only” ?

- The ISP runs NAT64 (and DNS64 as an option)
  - NAT64 Deployment Guidelines in Operator and Enterprise Networks
    - draft-palet-v6ops-nat64-deployment
- Routers and/or OSs need to support CLAT
  - Requirements for IPv6 Customer Edge Routers to Support IPv4 Connectivity as-a-Service
    - draft-ietf-v6ops-transition-ipv4aas
- In the DC, support for SIIT-DC
  - Stateless IP/ICMP Translation for IPv6 Data Center Environments
    - RFC7755

464XLAT Multiservice Network



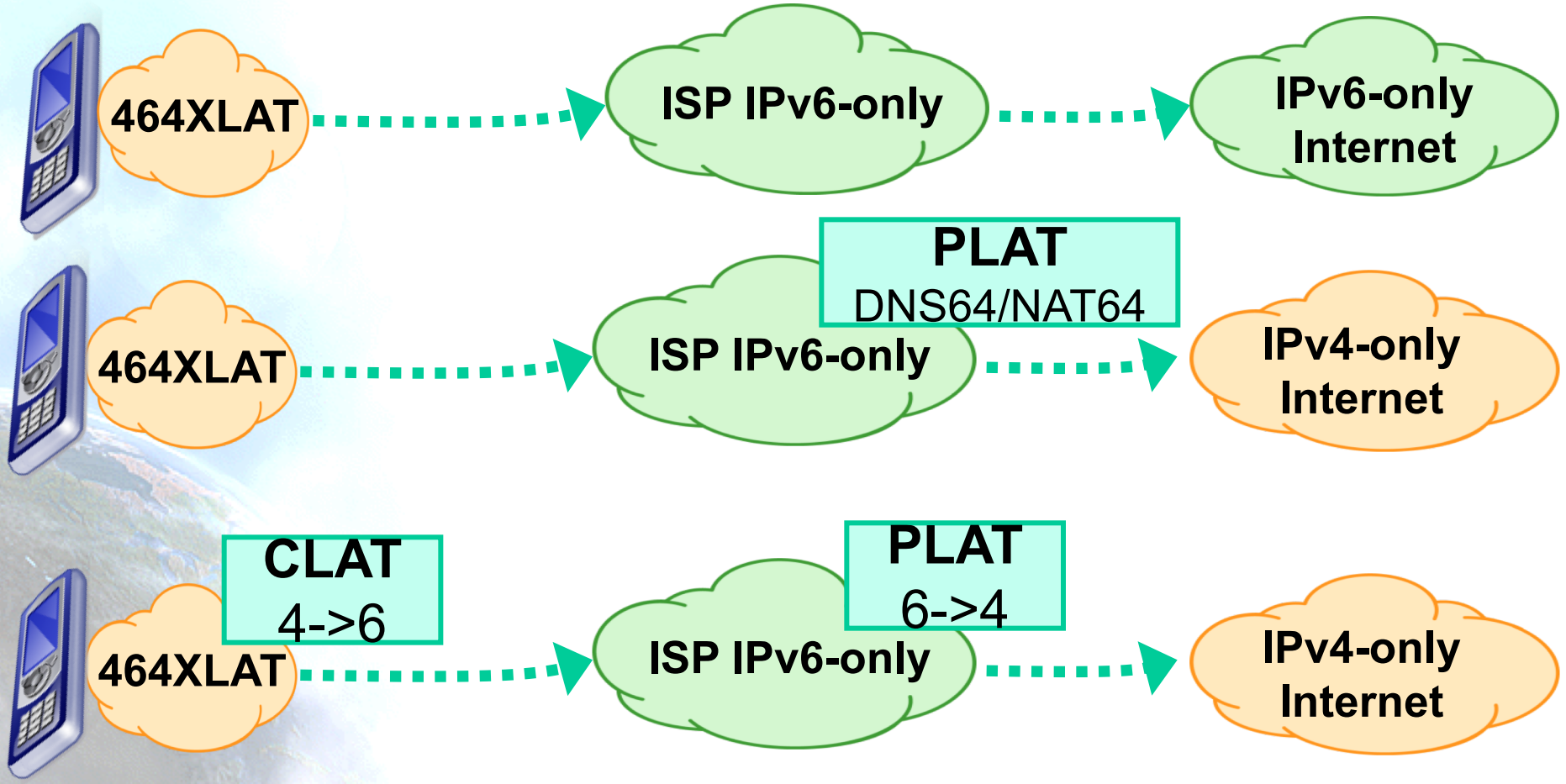
464LXAT: How it works ?



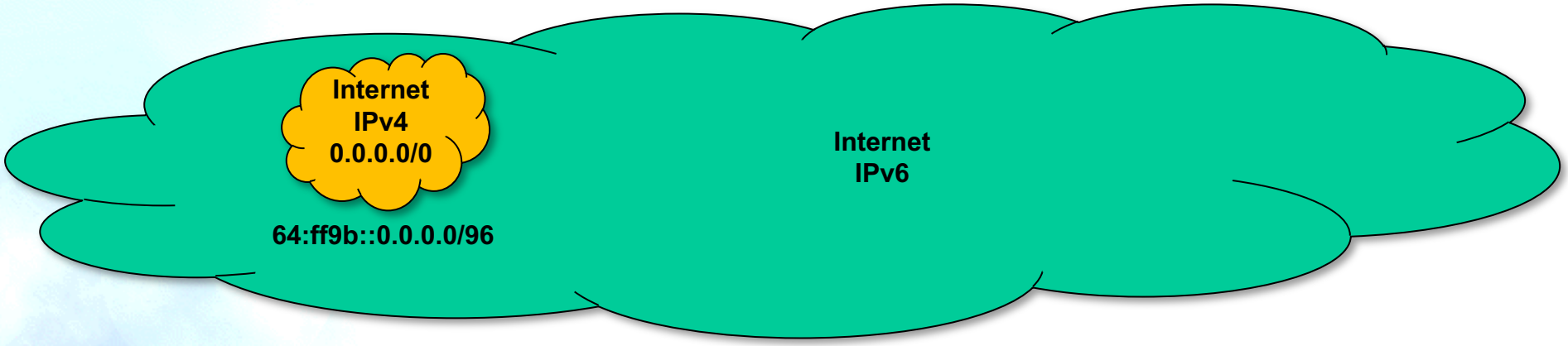
CLAT: Customer side translator (XLAT)

PLAT: Provider side translator (XLAT)

Possible “app” cases



SIIT-DC: Mapping all the IPv4 Internet



- An EAM (Explicit Address Mapping) table is configured in the SIIT-DC BR

Translation prefix: 2001:db8:46::/96

IPv4 pool: 192.0.2.0/24

EAM table:

IPv4 Internet address	Address in the DC
192.0.2.1	2001:db8:12:34::1
192.0.2.2	2001:db8:24:68::80
192.0.2.3	2001:db8:24:68::25

Availability and Deployment

- NAT64:
  - A10
  - Cisco
  - F5
  - Juniper
  - NEC
  - Huawei
  - Jool, Tayga, Ecdsys, Linux, OpenBSD, …
- CLAT
  - Android (since 4.3)
  - Nokia
  - Windows
  - NEC
  - Linux
  - Jool
  - OpenWRT
  - Apple (sort-of, is Bump-in-the-Host [RFC6535] implemented in Happy Eyeballs v2) - IPv6-only since iOS 10.2
- Commercial deployments:
  - T-Mobile US: +90 Millions of users
  - Orange
  - Telstra
  - SK Telecom
  - …
  - Big trials in several ISPs

IPv6 Point-to-Point Links

- Documenting different alternatives for IPv6 point-to-point links
  - draft-palet-v6ops-p2p-links
  - From a 2006 document and BCOP RIPE-690
- Rationale for /64, /127, /126 and others
- GUA, ULA or unnumbered?
- /64 from prefix customer
  - Example first /64 from a customer /48

Thanks!

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