A+P Overview

IETF76 Hiroshima

aplusp

Pierre Lévis

pierre.levis@orange-ftgroup.com
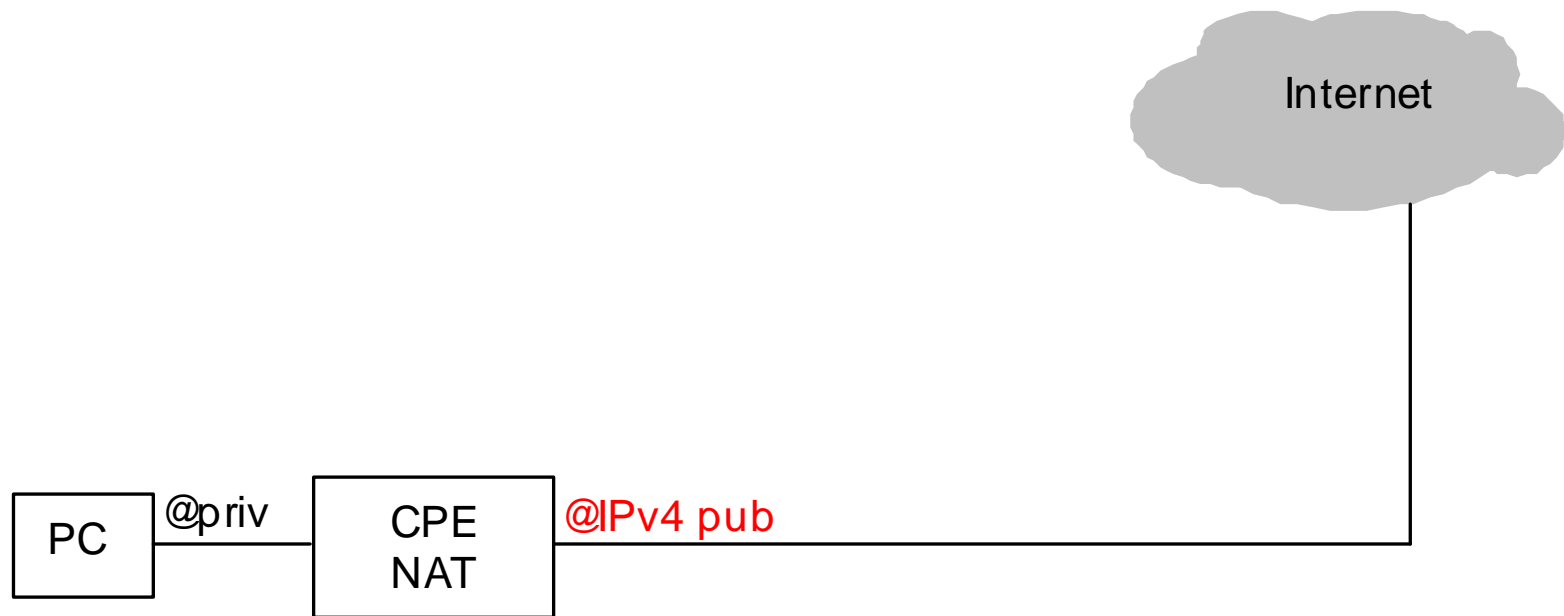
11th November 2009

Introduction

- The purpose of this presentation is to explain the main ideas of A+P

- The purpose of this presentation is NOT to provide a complete overview of all A+P proposals and use cases

- This presentation will introduce, as examples, some specific A+P implementations and use cases that are NOT meant to be the only ones possible

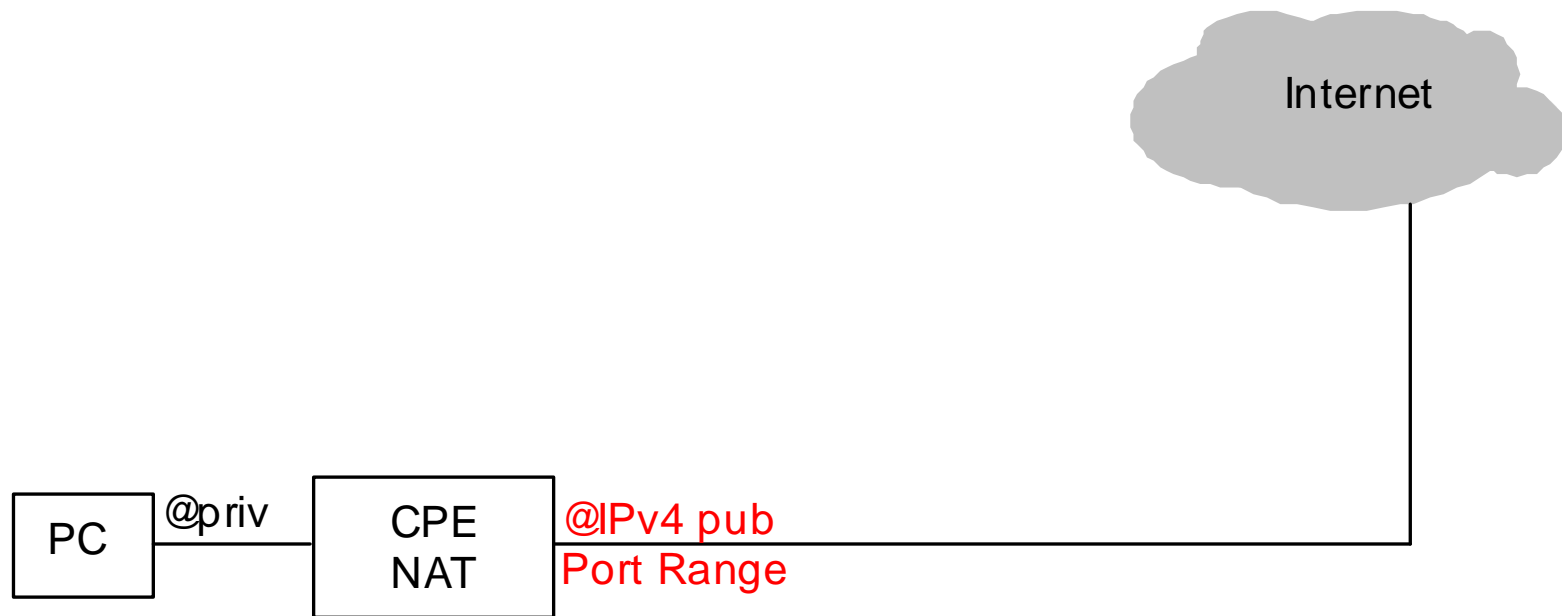   – Yes we can treat some aspects differently!

A+P names & proposals

- Different names: A+P or Port Range, or SAM, or…

  – We'll be using A+P in this presentation

- A+P can be implemented in different manners and applied on different use cases

  – A+P [I-D.ymbk-aplusp]

  – Port Range [I-D.boucadair-port-range]

  – Port Range + IPv6 [boucadair-behave-ipv6-portrange]

  – SAM [I-D.despres-softwire-mesh-sam]

  – Dual IVI [I-D.xli-behave-divi]

  – … ?
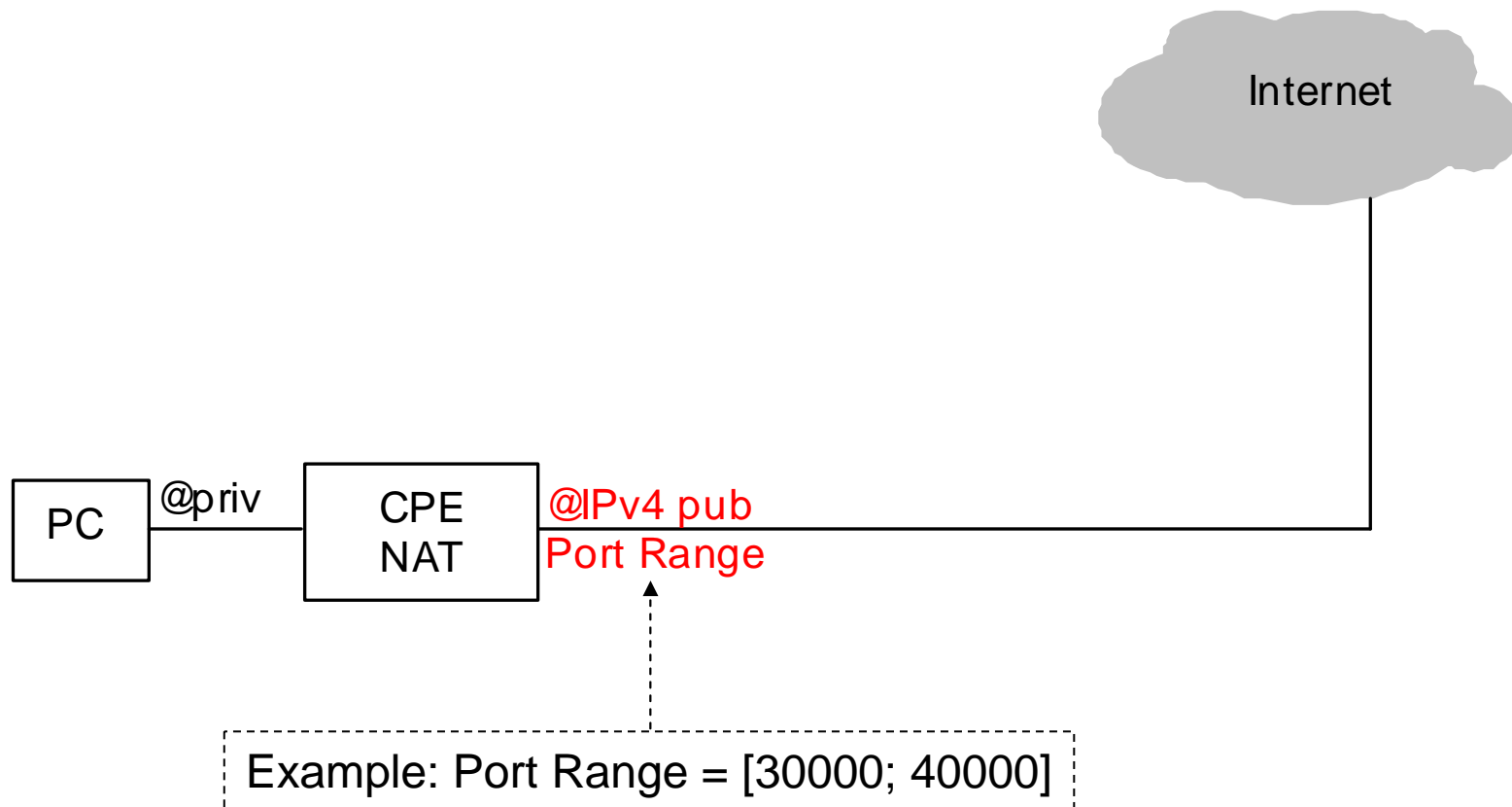
- These documents do have overlaps

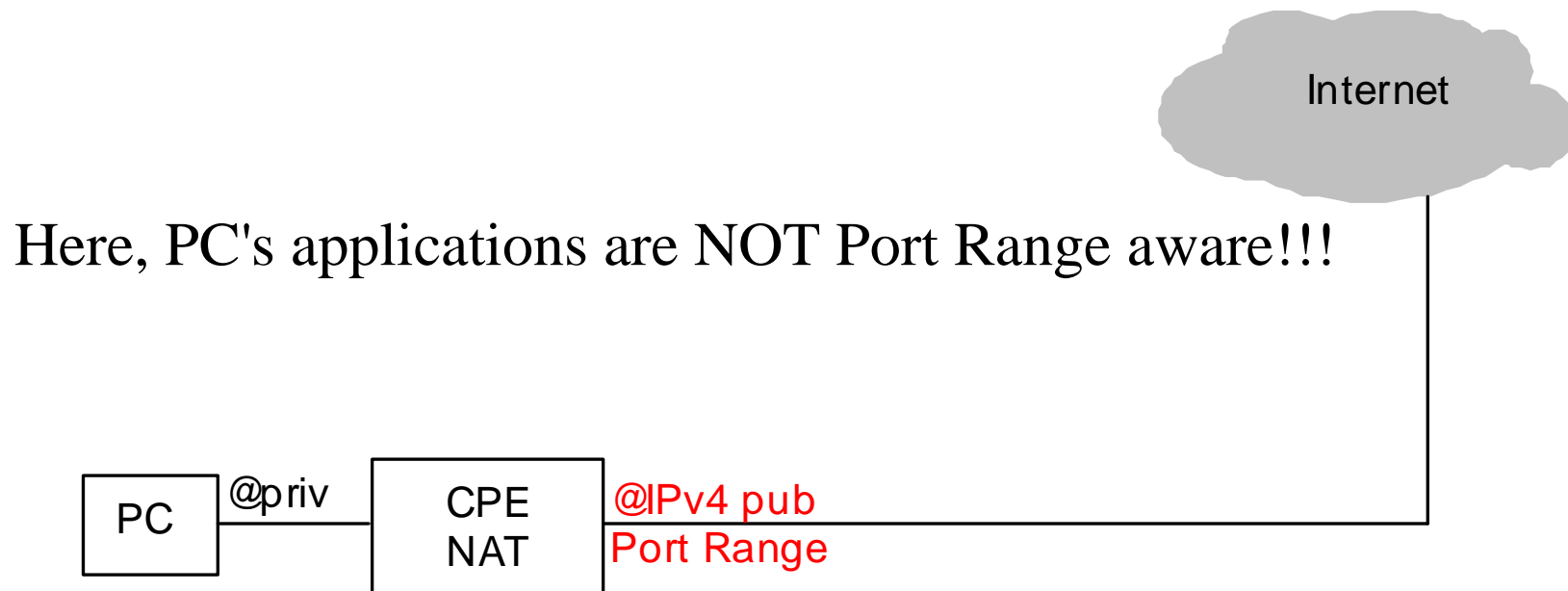# A+P Overview

Today Fixed Broadband Access

Internet

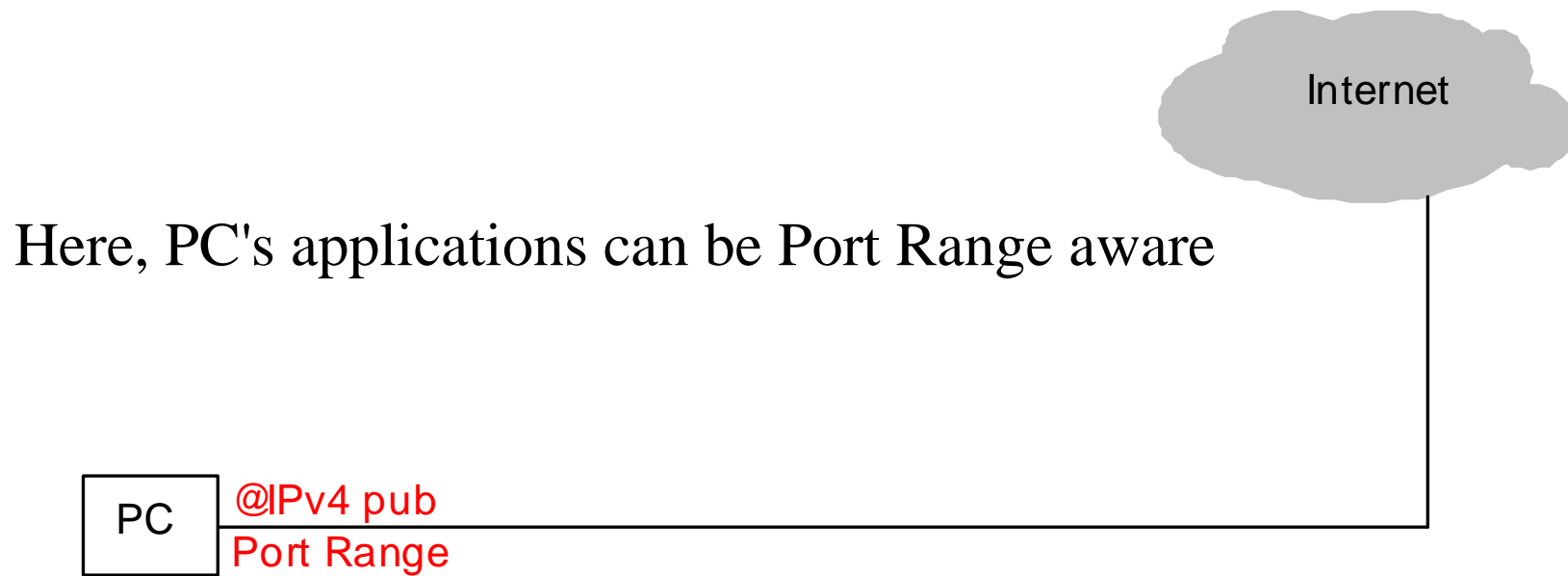PC — @priv — CPE NAT — @IPv4 pub — Internet

A+P: Port Range restriction

Internet

PC —@priv— CPE NAT —@IPv4 pub Port Range— Internet

A+P: Port Range restriction

Internet

PC @priv CPE NAT @IPv4 pub Port Range

Example: Port Range = [30000; 40000]

A+P: Port Range restriction

Internet

Here, PC's applications are NOT Port Range aware!!!

```
PC --- @priv --- CPE   @IPv4 pub
                 NAT   Port Range
```

A+P: Port Range restriction

Internet

Here, PC's applications can be Port Range aware

PC | @IPv4 pub
Port Range

A+P: Port Range restriction

Internet

Here, PC's applications are NOT Port Range aware!!!

PC — @priv — CPE NAT — @IPv4 pub / Port Range

A+P: outgoing packets

Internet

PC — @priv — CPE NAT — @IPv4 pub Port Range → Internet

A+P: incoming packets

Internet

PC

@priv

CPE
NAT

@IPv4 pub
Port Range

?

A+P: incoming packets

Internet

Port Range Handling of some sort

PC @priv CPE NAT @IPv4 pub Port Range

A+P: incoming packets

Does NOT mean IGP needs modification to take into account port information!!!

Internet

Port Range Handling of some sort

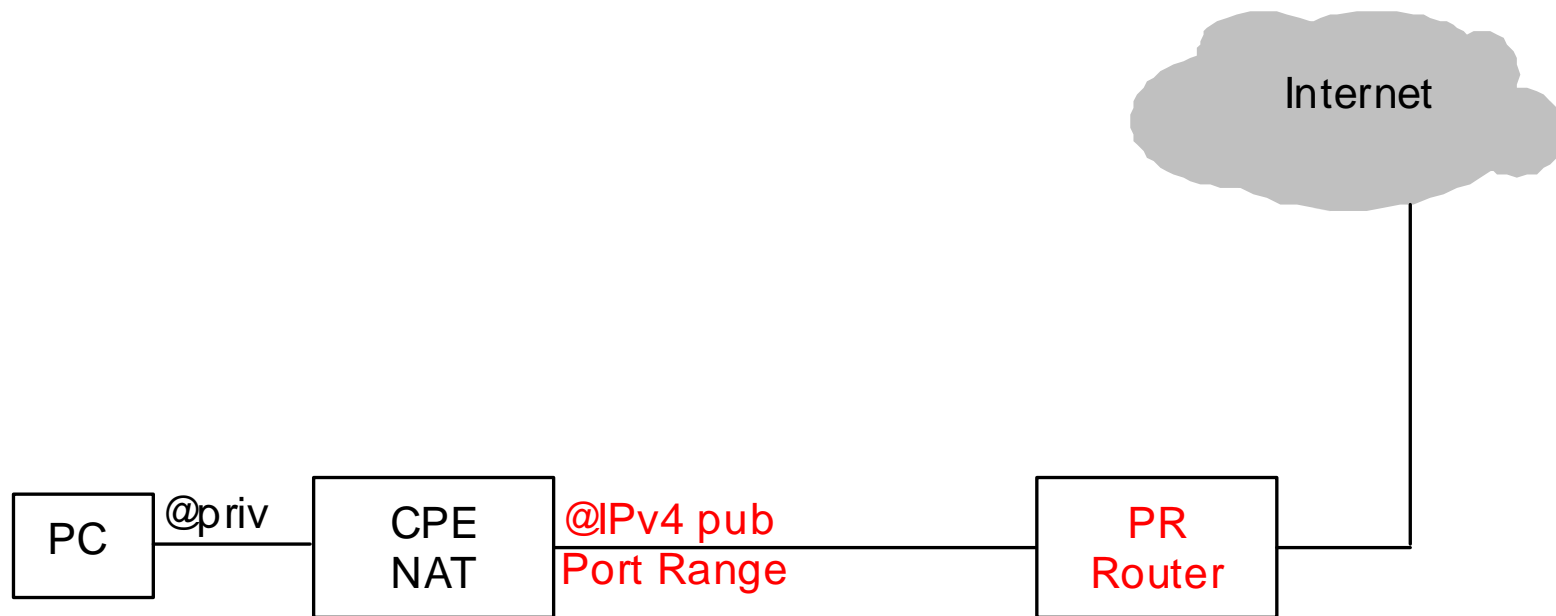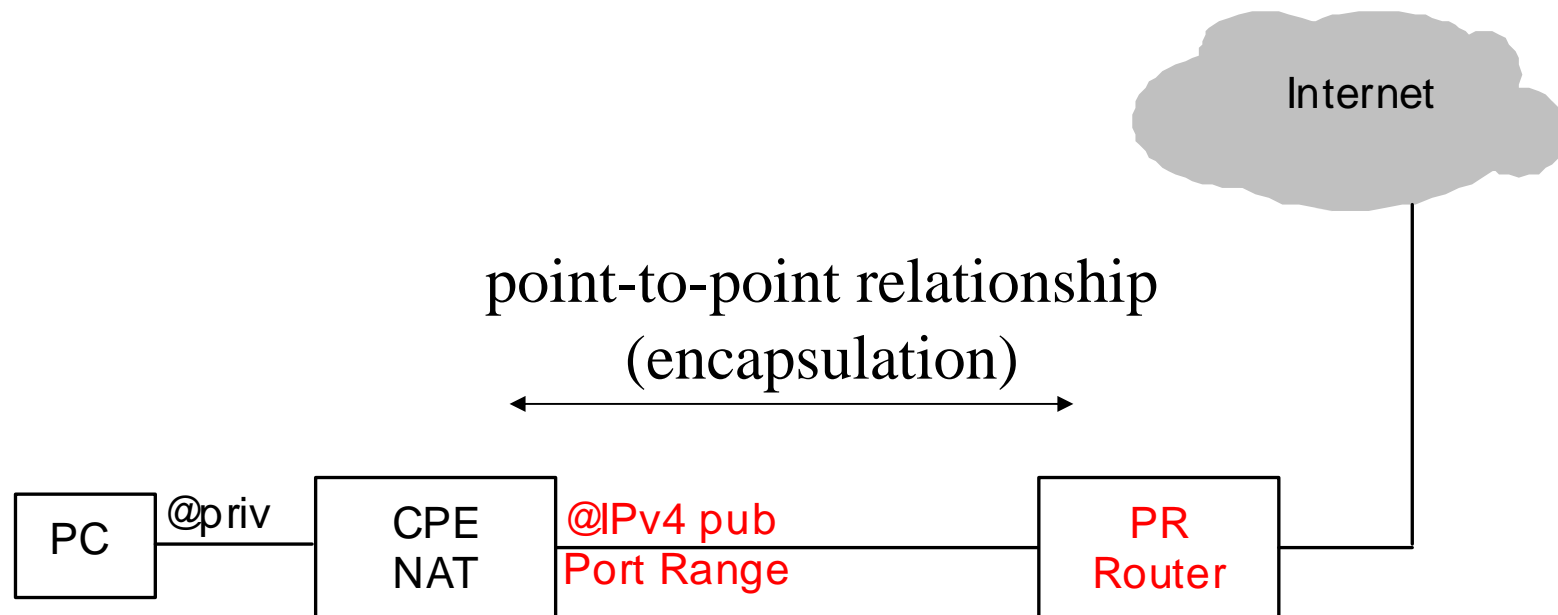| PC | @priv | CPE NAT | @IPv4 pub Port Range |
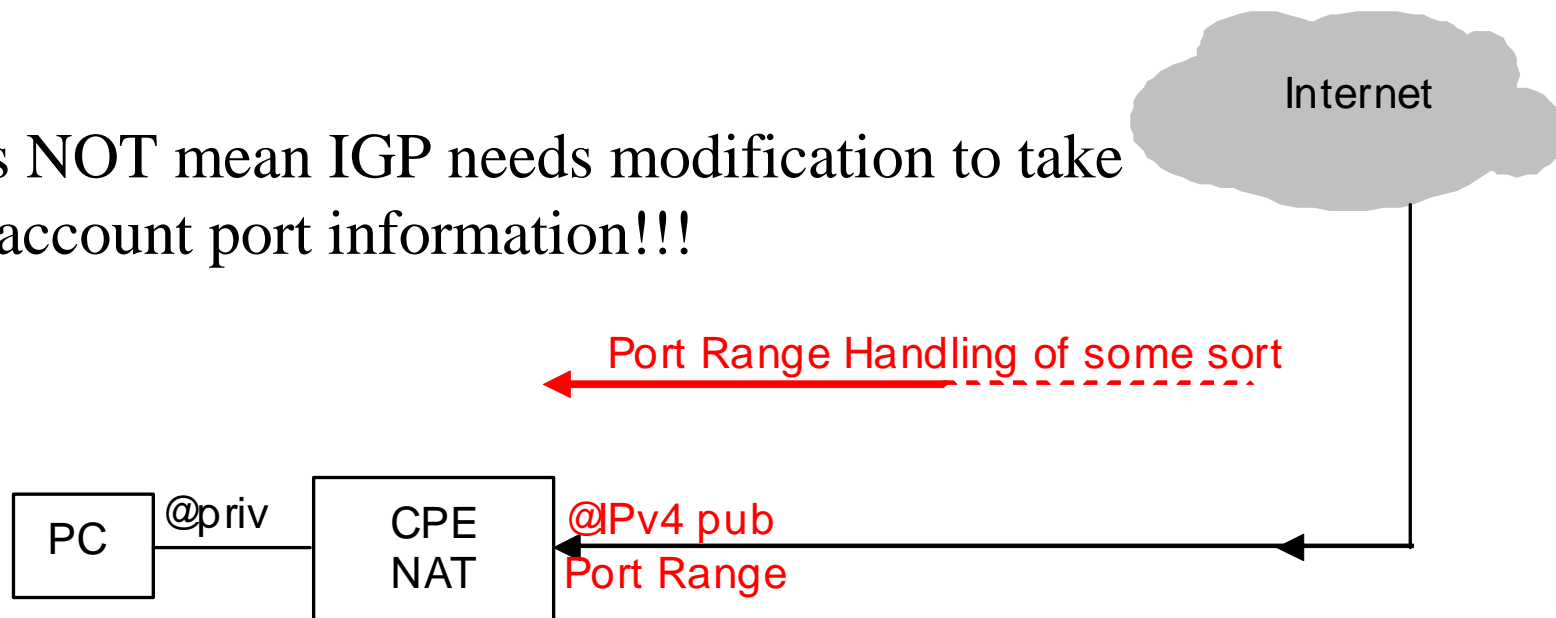
A+P solutions

- Will now discuss two ways to handle the incoming packets routing :

  - Example1: A+P with a Port Range Router (PRR) for Fixed Broadband Access
  - Example2: A+P with an IPv4-IPv6 Gateway for Fixed Broadband Access

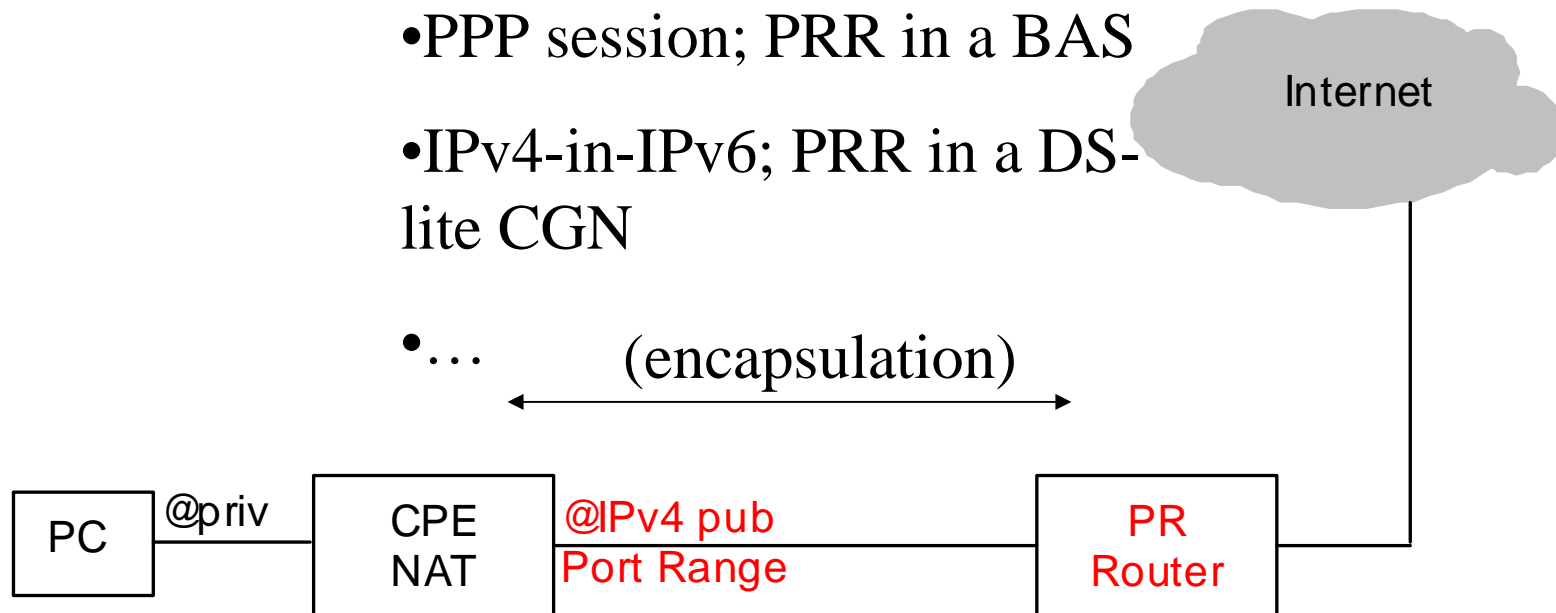# Example1: A+P with a Port Range Router (PRR) for Fixed Broadband Access
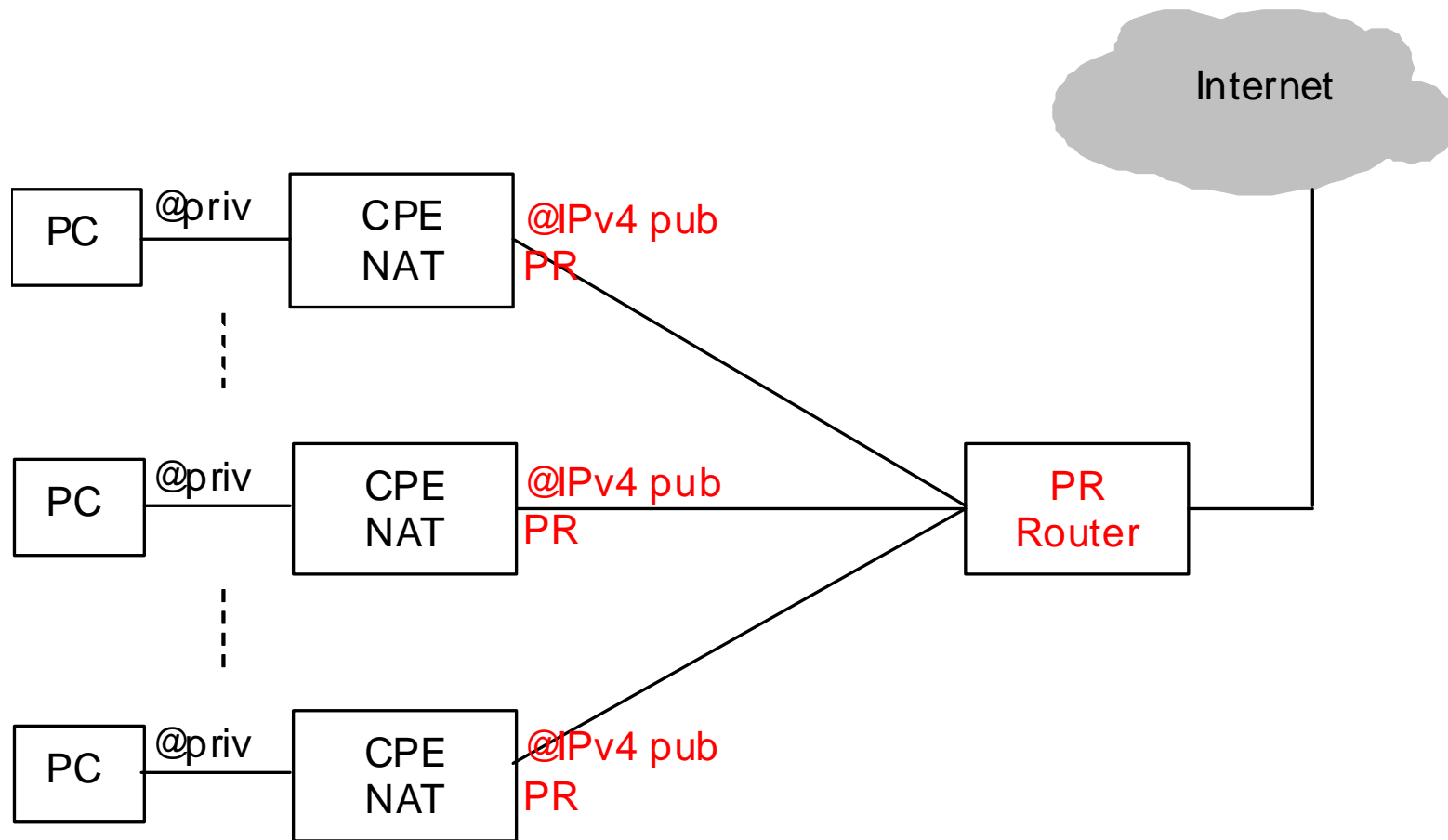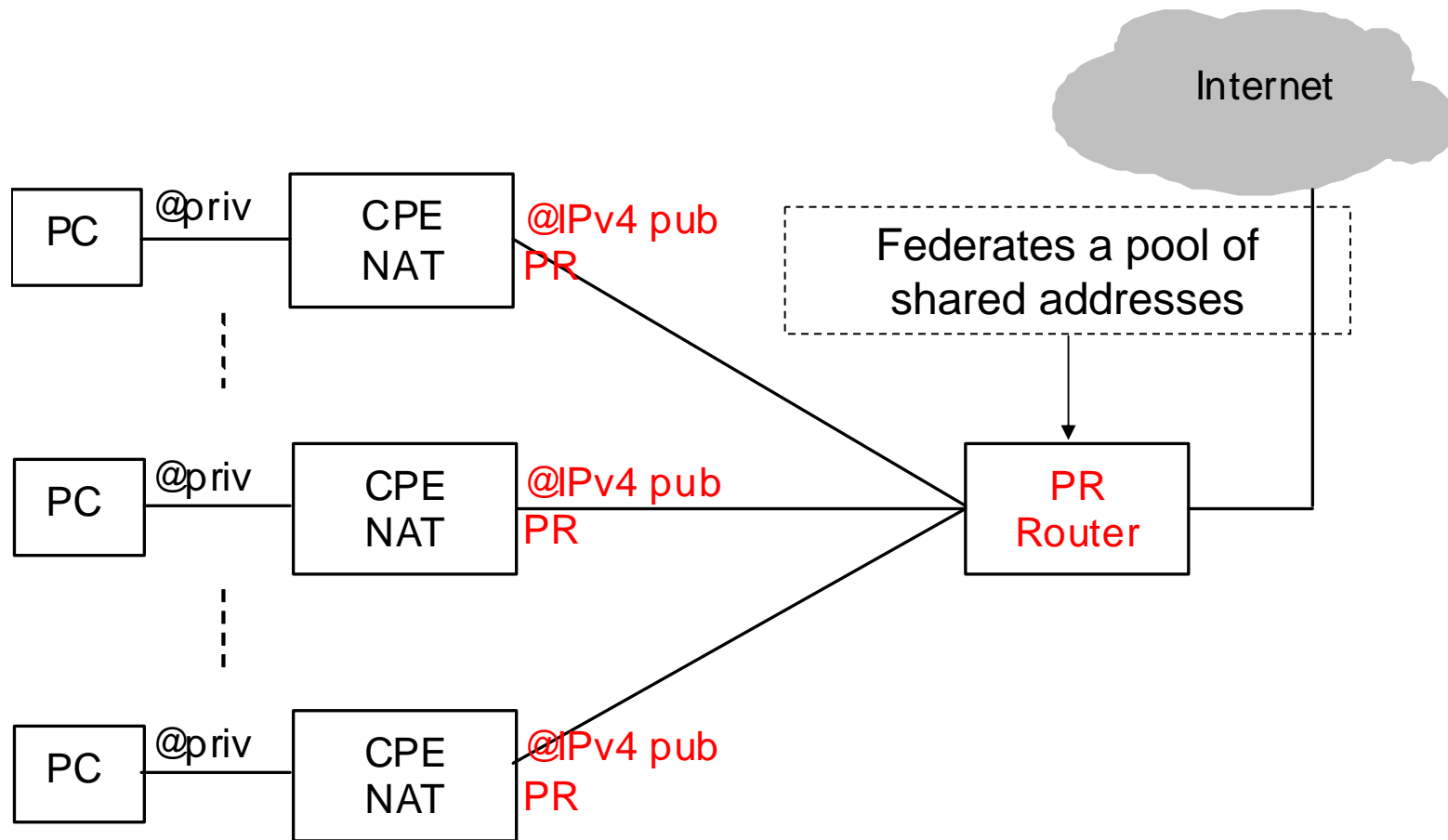
A+P with PRR

Internet

PC

@priv

CPE
NAT

@IPv4 pub
Port Range

PR
Router

A+P with PRR

point-to-point relationship
(encapsulation)

←————————————————————→

Internet

| PC | @priv | CPE NAT | @IPv4 pub Port Range | PR Router |

A+P with PRR

• PPP session; PRR in a BAS

• IPv4-in-IPv6; PRR in a DS-lite CGN

• …

Internet

(encapsulation)

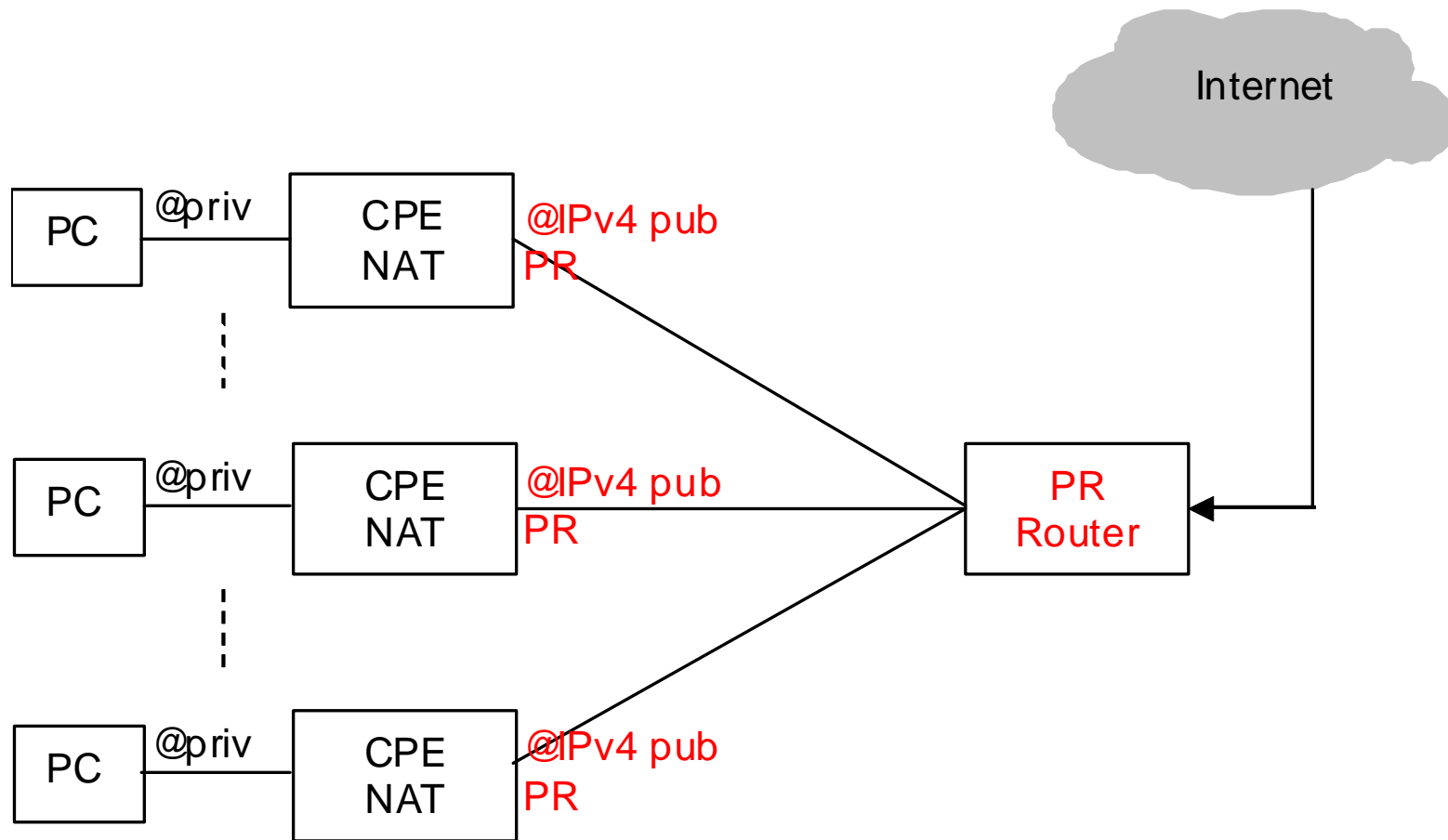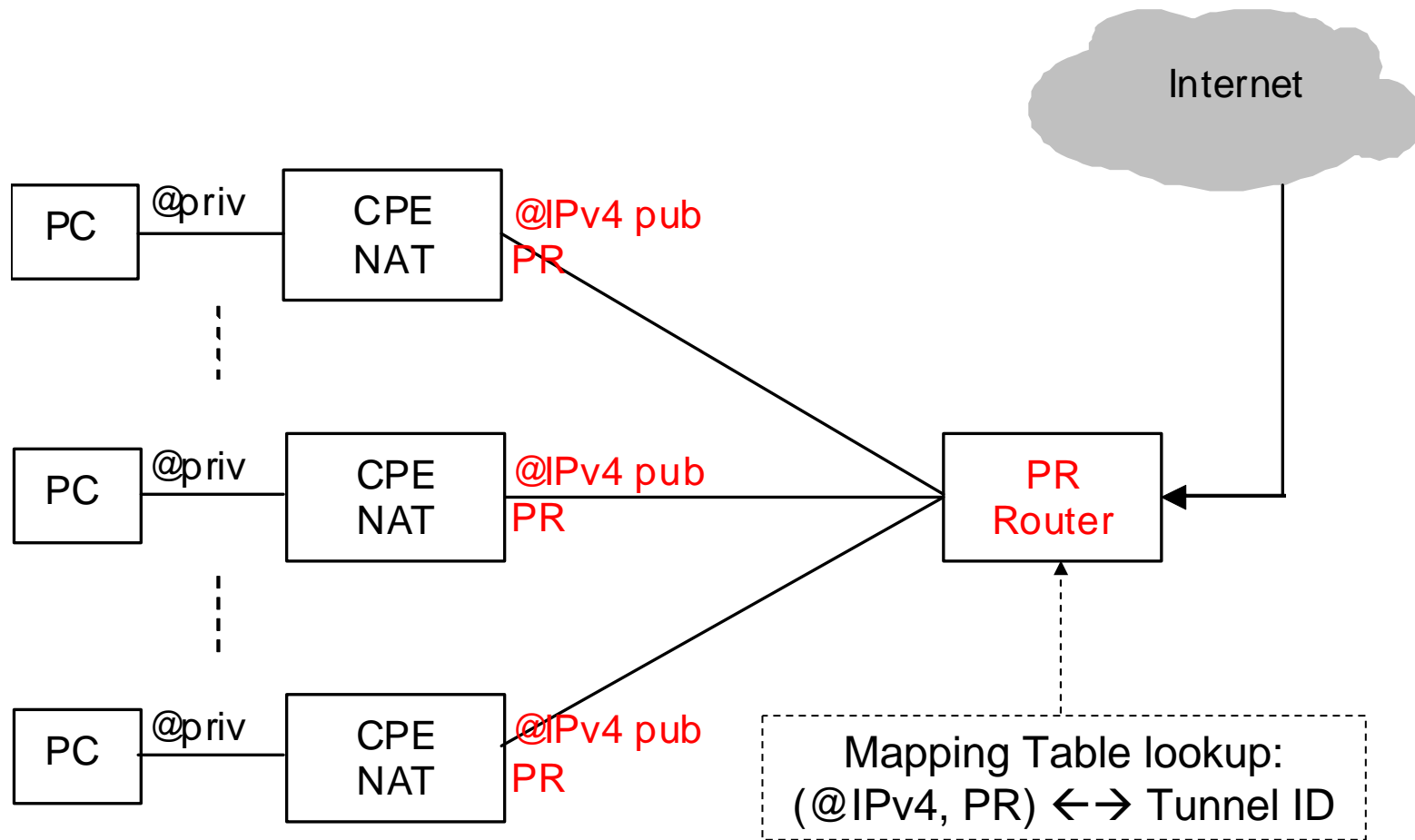| PC | @priv | CPE NAT | @IPv4 pub Port Range | PR Router |

A+P with PRR

A+P with PRR

A+P with PRR

A+P with PRR

Internet

PC —@priv— CPE NAT —@IPv4 pub PR—

PC —@priv— CPE NAT —@IPv4 pub PR—

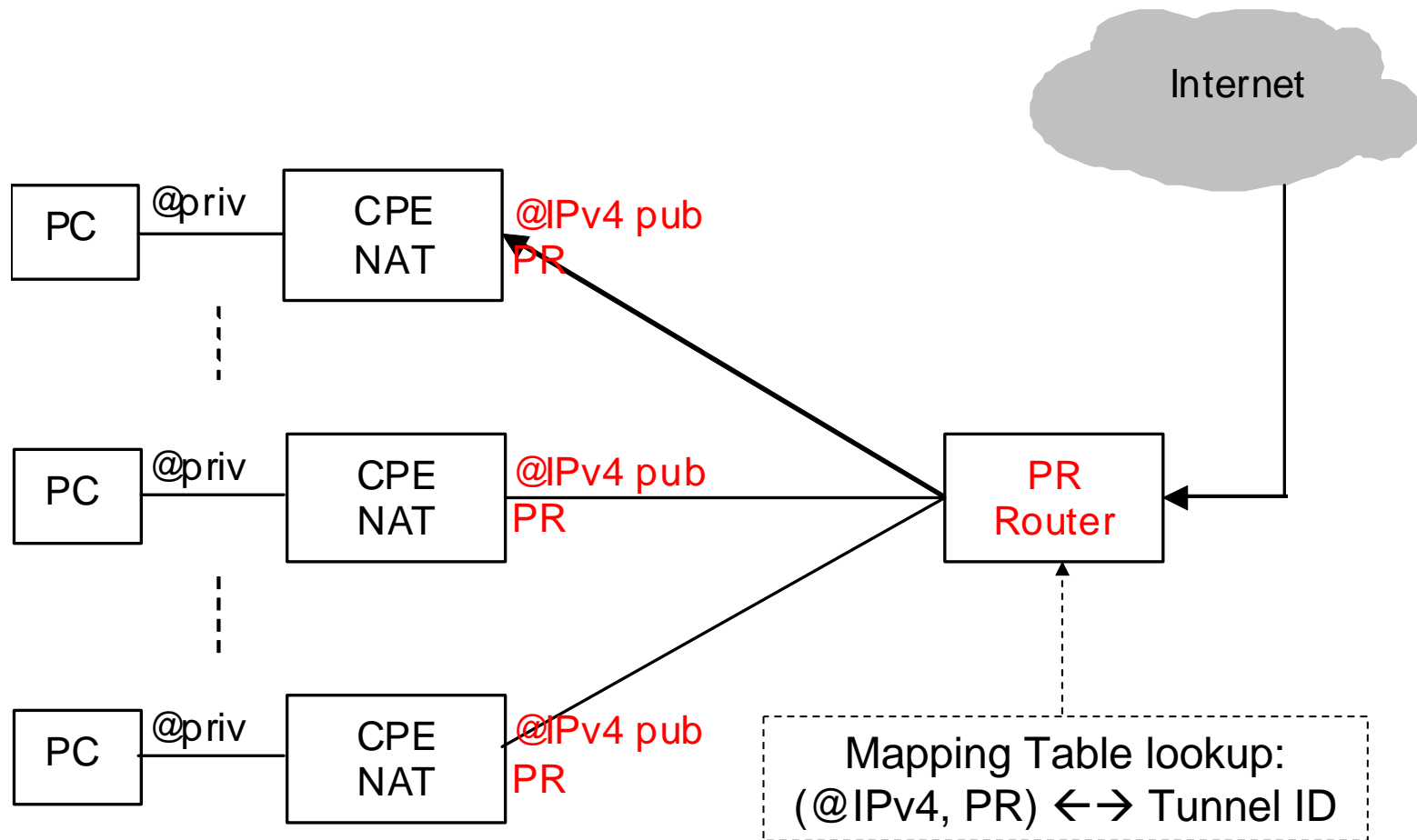PC —@priv— CPE NAT —@IPv4 pub PR—

PR Router
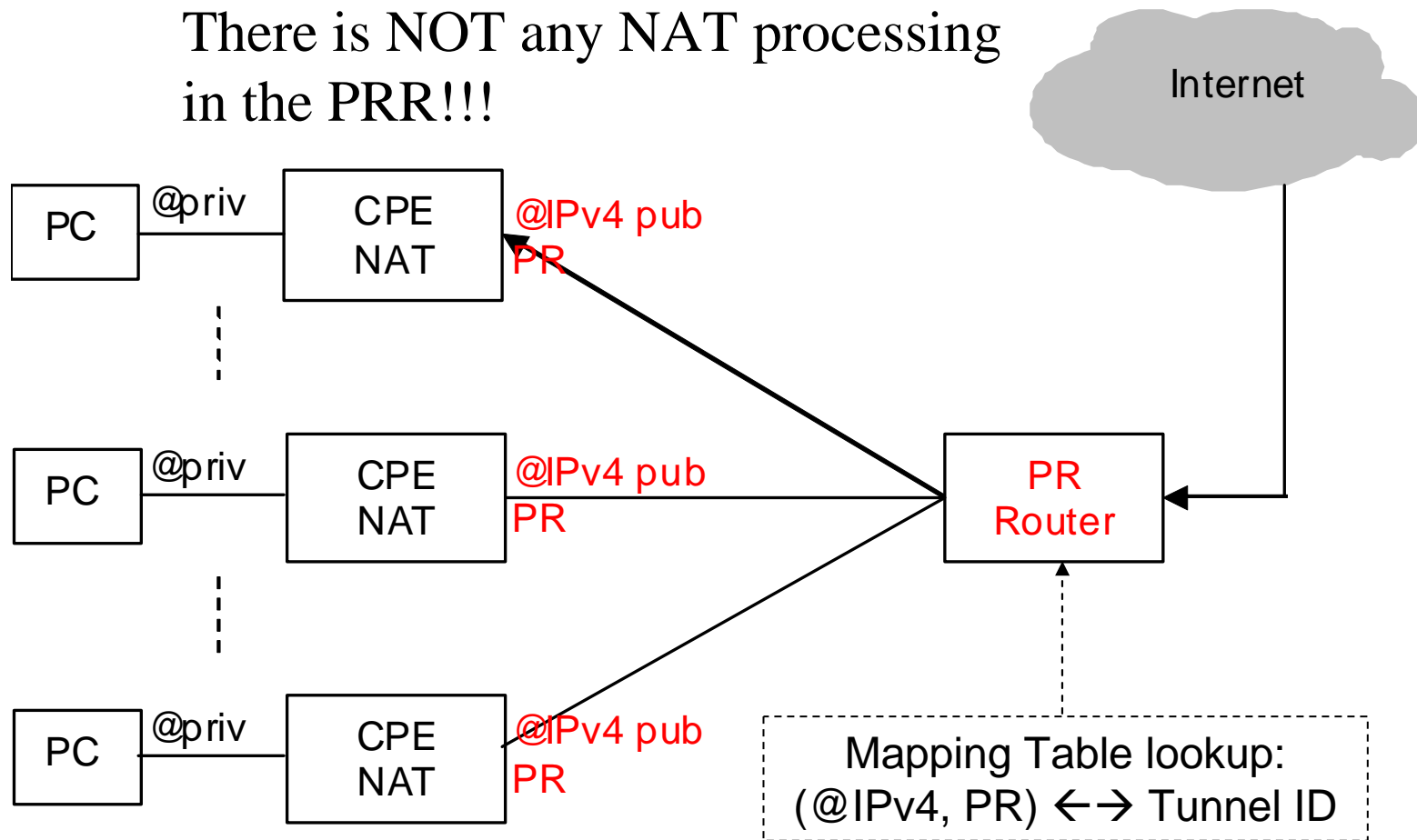
Mapping Table lookup:
(@IPv4, PR) ←→ Tunnel ID
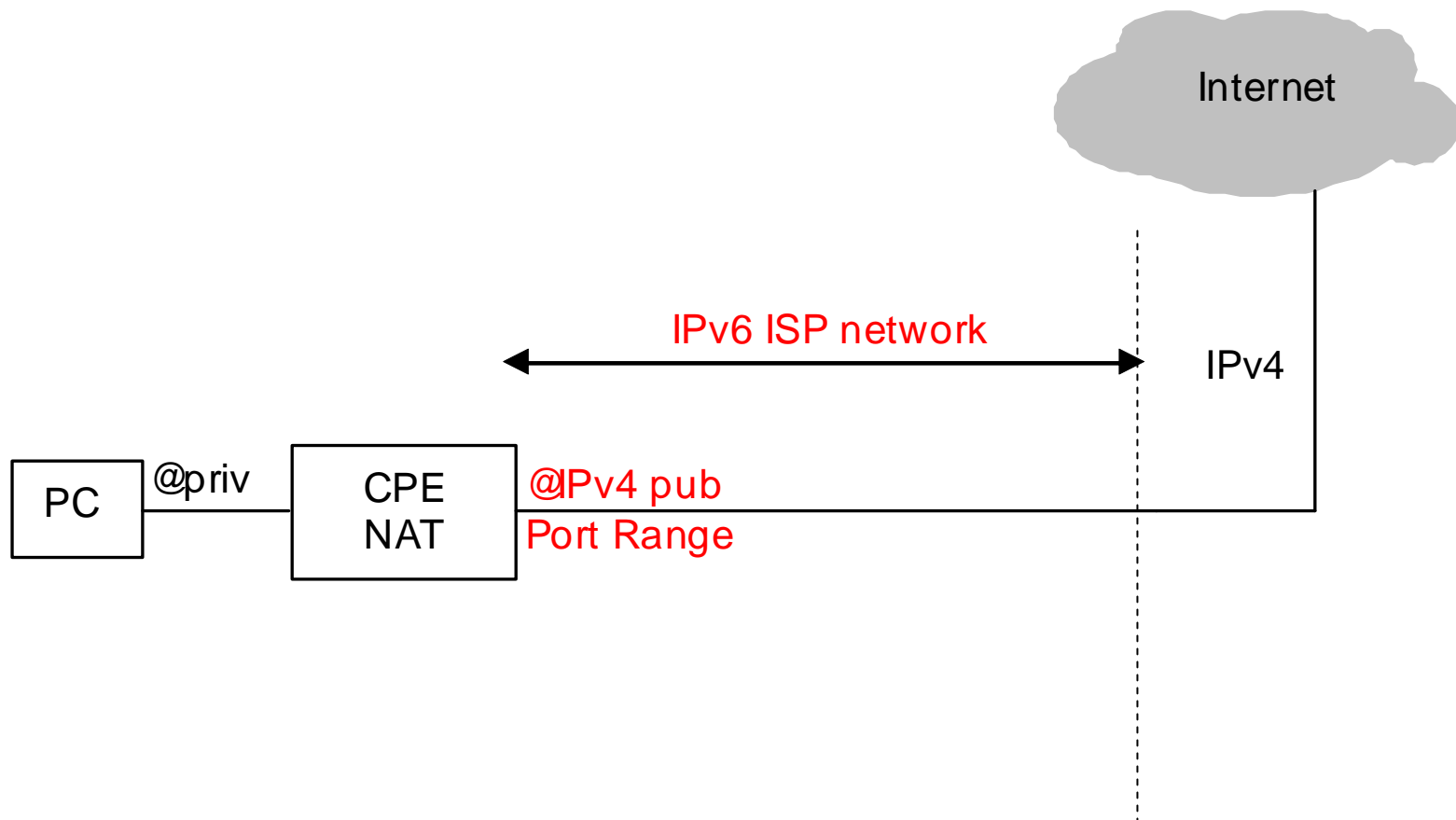
A+P with PRR

A+P with PRR

There is NOT any NAT processing
in the PRR!!!

Example2: A+P with an IPv4-IPv6 Gateway for Fixed Broadband Access

A+P with IPv4-IPv6 Gateway

Internet

IPv6 ISP network

IPv4

PC

@priv

CPE
NAT

@IPv4 pub
Port Range

A+P with IPv4-IPv6 Gateway

Internet

IPv4-in-IPv6 Encap

| PC | @priv | CPE NAT | @IPv4 pub Port Range | | IPv4-IPv6 Gateway |

A+P with IPv4-IPv6 Gateway

@IPv6dest =
Pref6+@IPv4+(Port)

Internet

IPv4-in-IPv6 Encap

| PC | @priv | CPE NAT | @IPv4 pub Port Range | IPv4-IPv6 Gateway |

A+P with IPv4-IPv6 Gateway

Internet

@IPv6dest =
Pref6+@IPv4+(Port)

IPv4-in-IPv6 Encap

| PC | @priv | CPE NAT | @IPv4 pub Port Range | | IPv4-IPv6 Gateway |

IPv6 Prefix:
Pref6+@IPv4+PR
allocated to the CPE
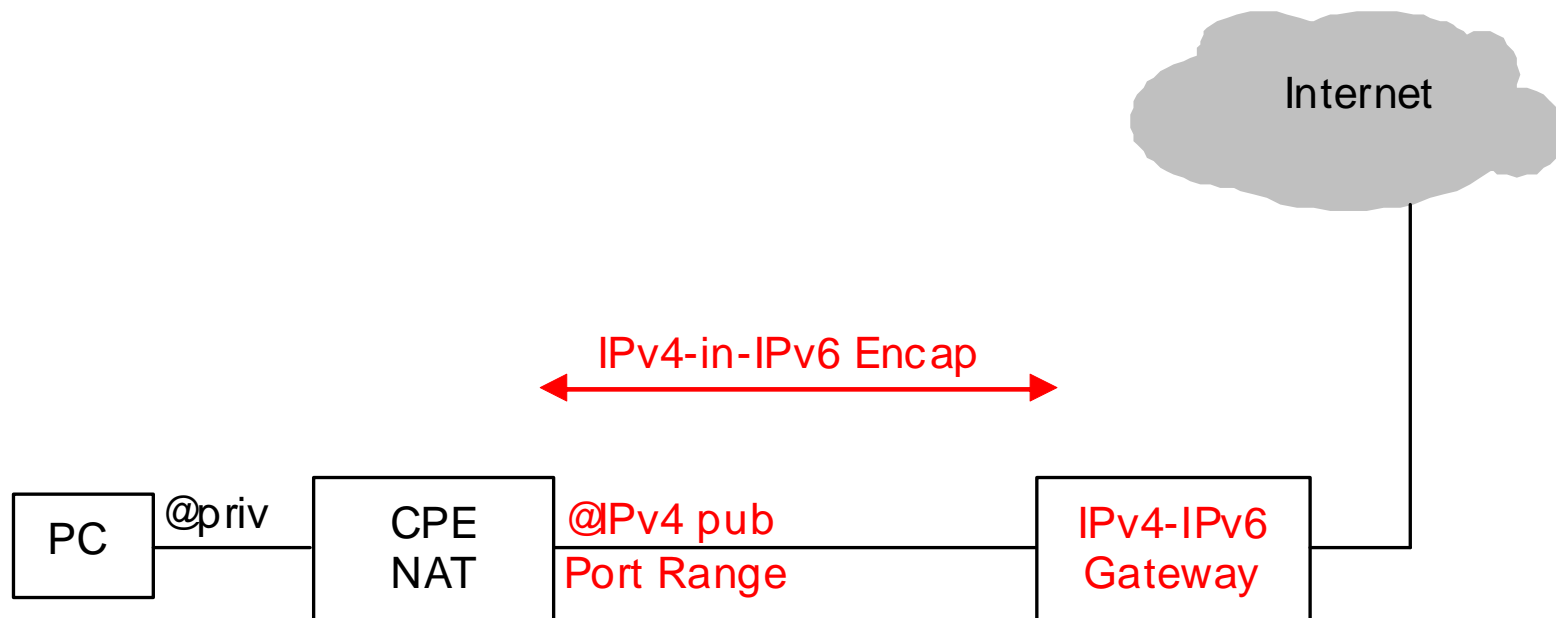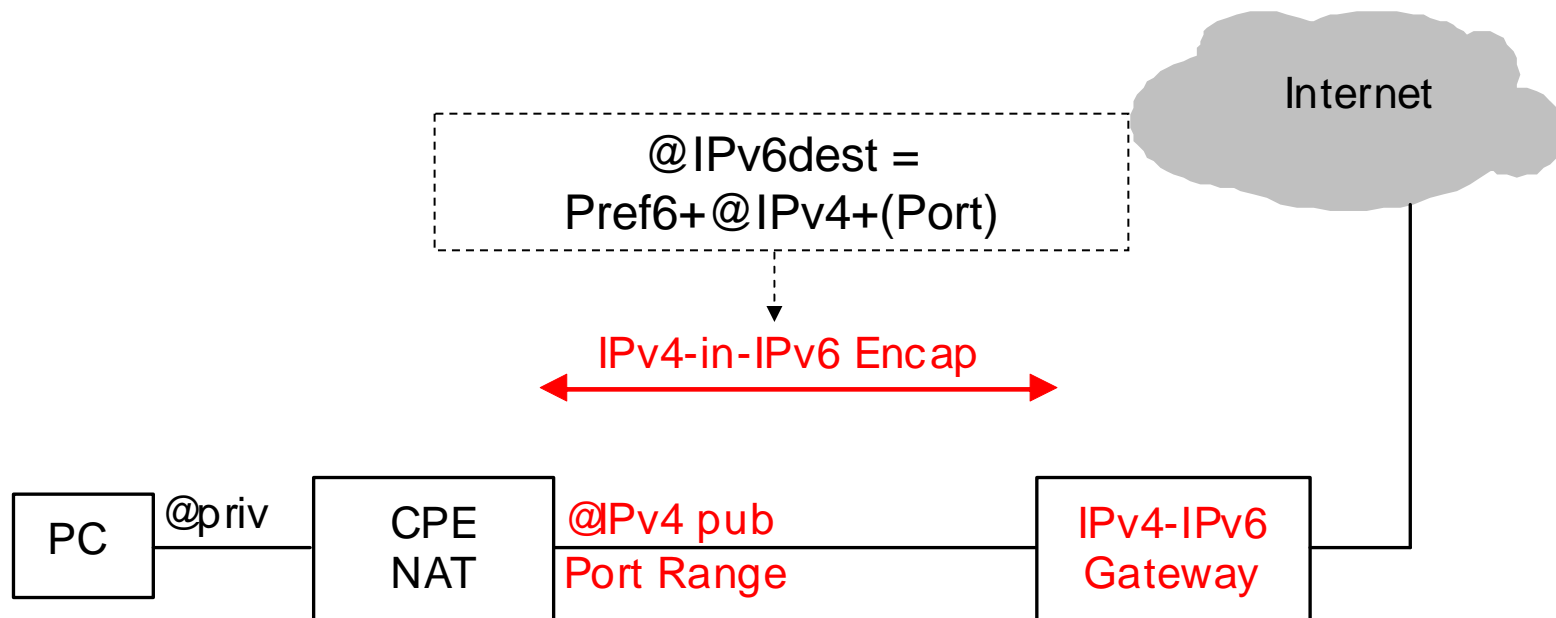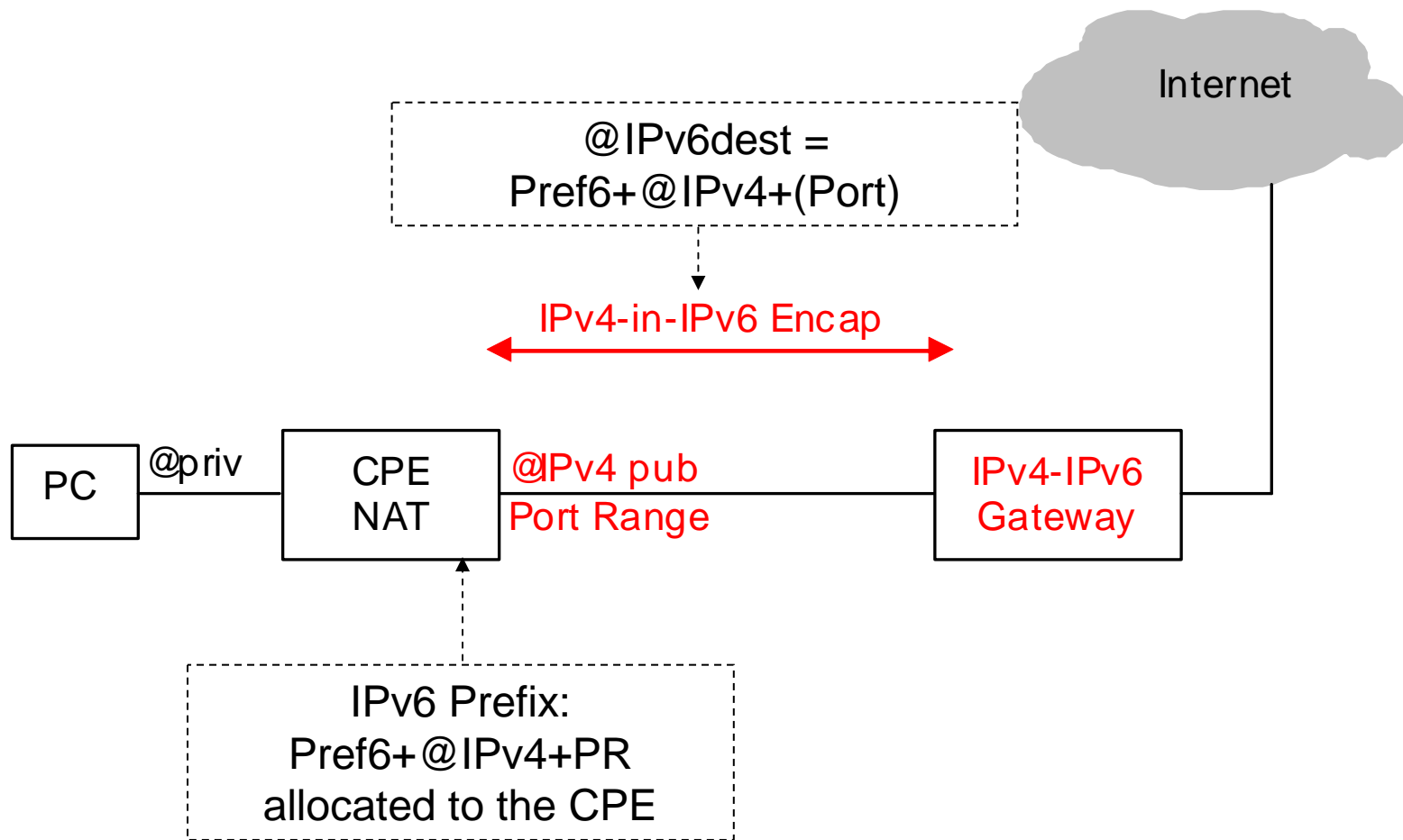
A+P with IPv4-IPv6 Gateway

Here, encapsulations are stateless (NO Mapping
Table)!!!

Internet

@IPv6dest =
Pref6+@IPv4+(Port)

IPv4-in-IPv6 Encap

PC — @priv — CPE NAT — @IPv4 pub Port Range — IPv4-IPv6 Gateway

IPv6 Prefix:
Pref6+@IPv4+PR
allocated to the CPE

31

31
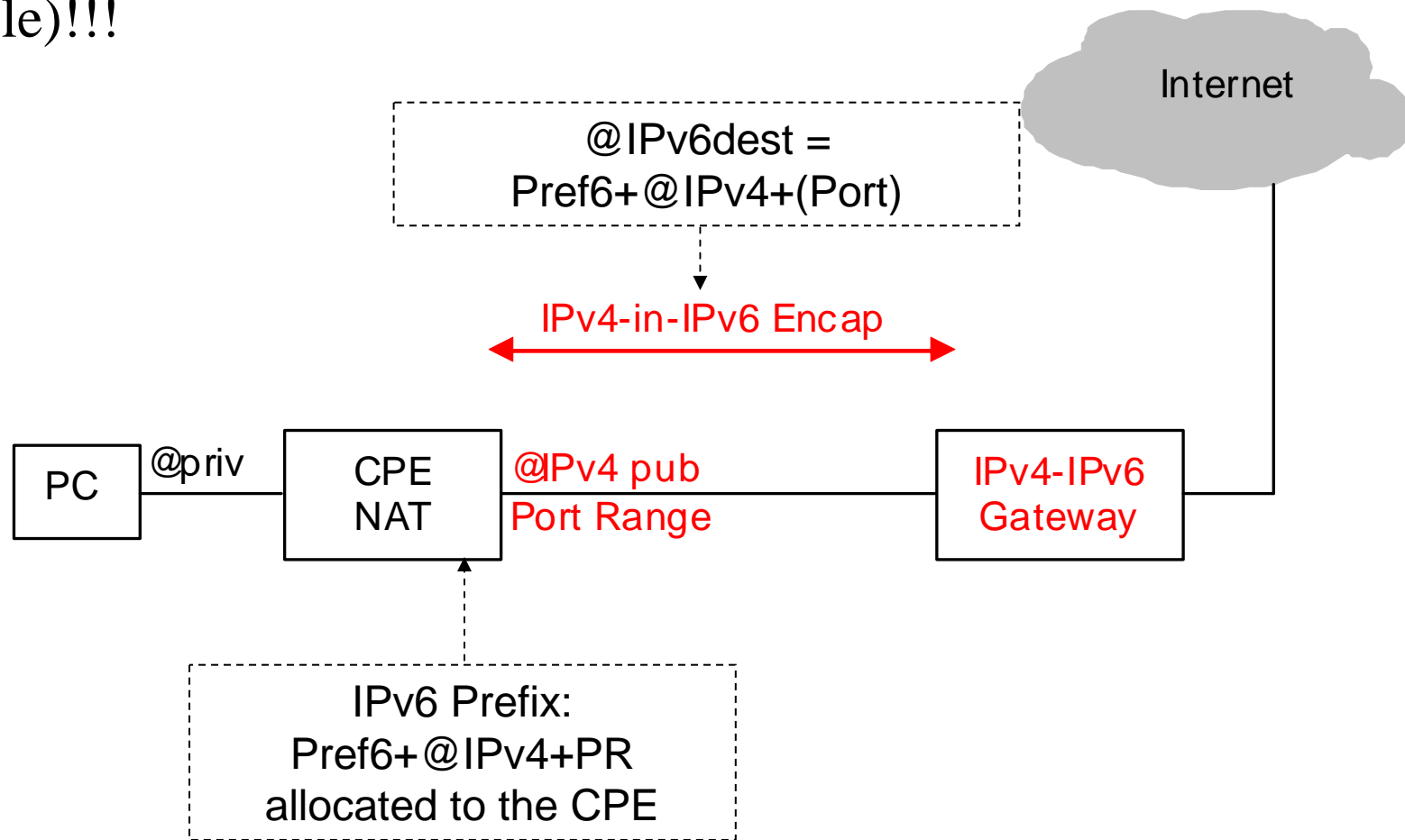
Main Points

A+P:

- You do NOT need and you do NOT want to modify routing protocols to take into account port information

- There is NOT any NAT in the Provider's network

- You do NOT need to make PC's applications Port Range aware

    – You may want to; if the PCs are PR-enabled, then no NAT at all!

- The amount of states is proportional to the number of users, it is not proportional to the number of on-going TCP/UDP sessions, as in CGN solutions

    – Can even rely on IPv6 stateless encapsulation

- PRR and DS-lite CGN can be co-located

Thank You