4rd Address Mapping

draft-despres-softwire-4rd-addmapping-01

Issues left open in draft-01 of the MAP design team

(IPv4 Residual Deployments across IPv6 domains,
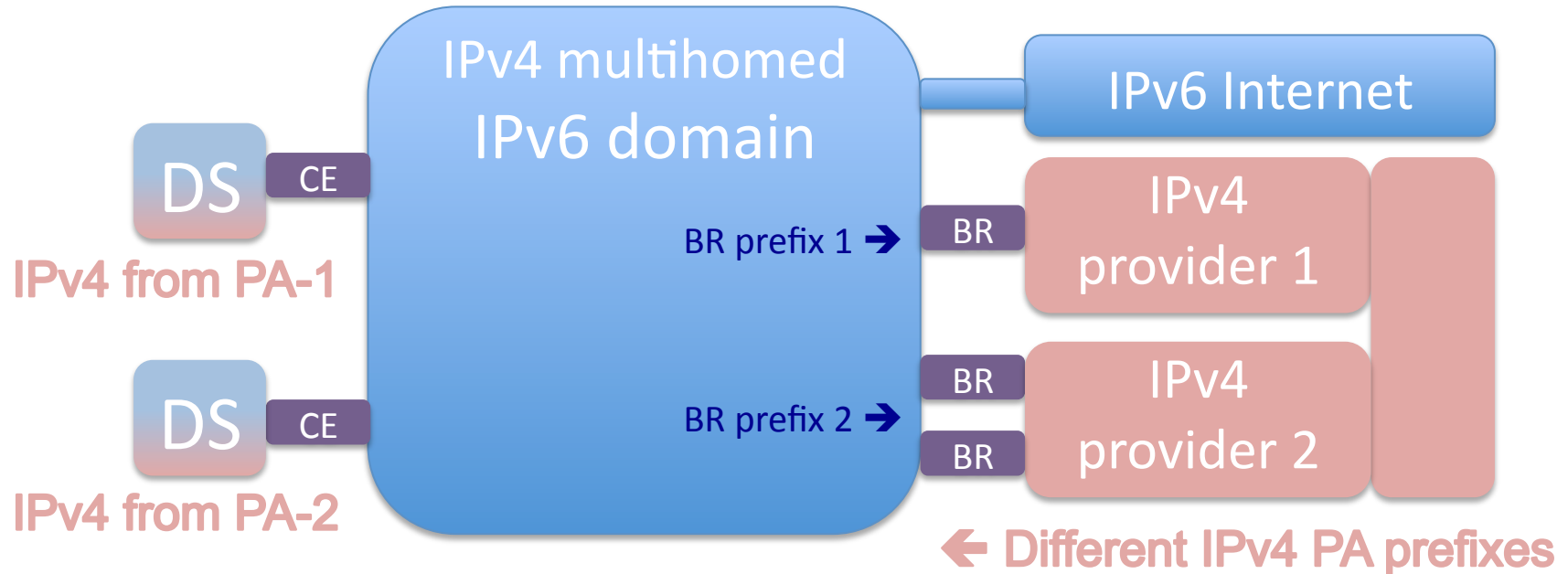generic for Encapsulation and Double Translation, Stateless)

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Multiple BR prefixes

DS — CE

IPv4 from PA-1

DS — CE

IPv4 from PA-2

IPv4 multihomed IPv6 domain

IPv6 Internet

BR prefix 1 ➜ — BR — IPv4 provider 1

BR — BR prefix 2 ➜ — IPv4 provider 2 — BR

← **Different IPv4 PA prefixes**

- The exit BR from a CE must be one whose PA has been used to build the CE IPv4 address or prefix
- Multiple BR prefixes are therefore necessary in a domain
- A BR can have several IPv4 PAs, and as many mapping rules (=> see impact on DHCPv6 format)

Max CE prefix – an Example

```
A+P DST address            : XXXX XXXX XXXX
Matching Rule-IPv4-prefix : AAAA                    e.g. /16
IPv6 prefix of this rule  : EEEE EEEE E            e.g. /36

=> A+P address             : AAAA BBBB CDDD
                                      BBBB = IPv4 suffix
                                      DDD = Max PSID (Port-set ID)

=> Max CE prefix           : EEEE EEEE EBBB BDDD
     It reaches ANY of the following types of DST CEs:
```

CE prefix length	Prefix				Nb of v4 add	Nb of ports	Sharing ratio
/60	EEEE	EEEE	EBBB	BDD	1	60	256
/56	EEEE	EEEE	EBBB	BD	1	960	16
/52	EEEE	EEEE	EBBB	B	1	N/A	N/A
/48	EEEE	EEEE	EBBB		16	N/A	N/A

➢ **IPv4 prefixes, addresses, shared addresses, are all supported (generality)**

➢ **One mapping rule supports various sharing ratios (simplicity)**

Node Implementations with Max CE prefix

- IPv6 Packets that reach a CE for 4rd processing have several possible values of IPv6 DST addresses. (They reach the CE because they all start with the CE IPv6 prefix)

- This is an implementation constraint, but **not a novelty**: Translation algorithms have it for DST nodes that support multiple IPv4 addresses (BRs and CEs that are assigned IPv4 prefixes shorter than /32).

- In deployments where Max-CE-prefixes aren't used (CE-prefix lengths in Mapping rules, and no CE having IPv4 prefixes < /32), and if useful for faster processing of real non-4rd IPv6 packets, 4rd packets can still be received at a fixed exclusive prefix.

Fixed PSID offset = 4

```
PORTS:    [ > 0 ][ PSID ][ any value ]
    Offset < 4 >
              <---------- 16 ---------->
```
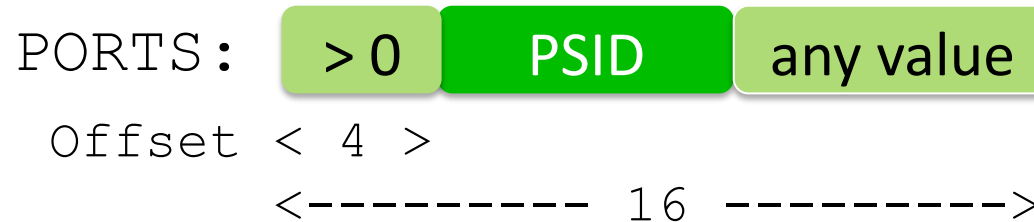
1. Fixed PSID-offset => no parameter needed (simplicity)
2. Offset = 4
   a. The PSID is nibble-aligned (easy interpretation in hexadecimal)
   b. High sharing ratios are supported (SR = 2048 => 30 ports per CE. It may become useful for IPv6-capable mobile phones)

   NOTE: 4096 ports are excluded (vs. only 1024 if Offset = 6), but the number of ports is reduced by only less than 4,8 %

   => acceptable in view of a. and b.

➔ Proposal

Include in the MAP design :

1. Multiple BR prefixes with choice determined by source CE prefix

2. Max CE prefixes in IPv6 addresses

3. Fixed PSID offset = 4