IPv6 Site connection to many Carriers

draft-fbnvv-v6ops-site-multihoming-01

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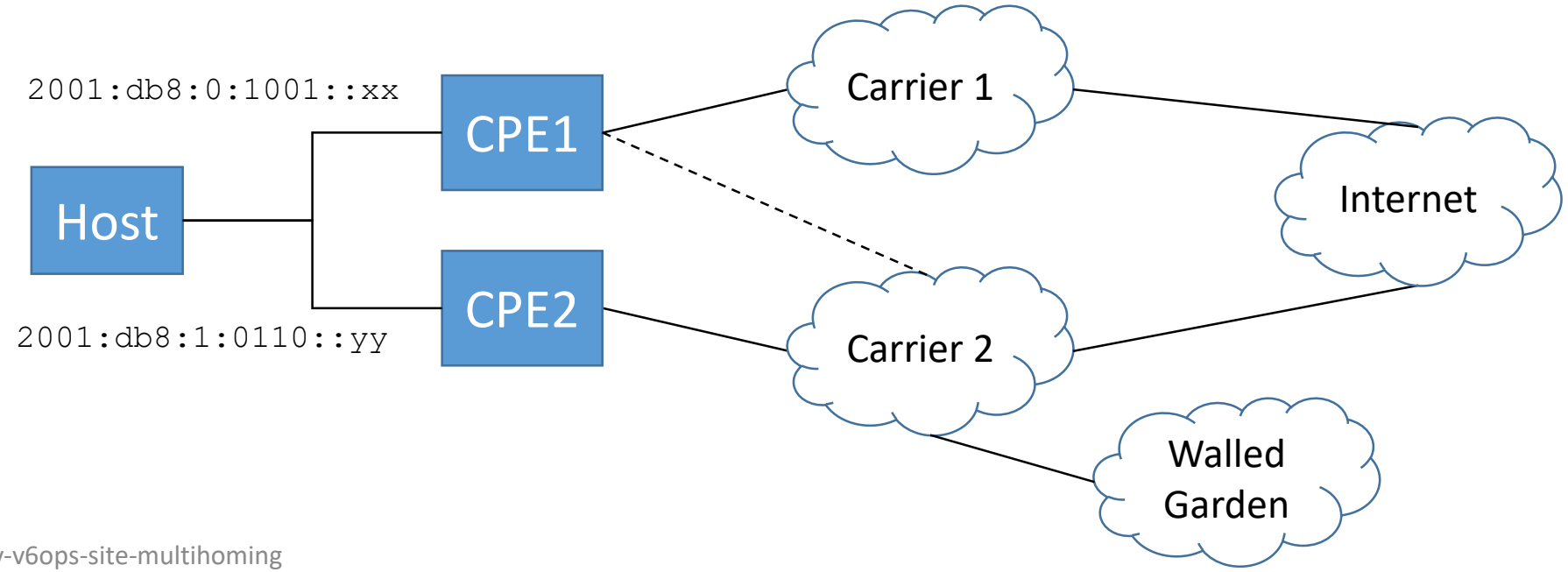
Problem Statement

Always-on connectivity is a key requirement for the vast majority of businesses.

Issues may affect the connection of a business to its upstream service provider. A redundant connection to the carrier is then the norm for business.

Native IPv6 solutions for carrier resiliency, however, have drawbacks.

The draft discusses all currently-available options to organize carrier resiliency for a site, their strengths and weaknesses, and provides a history of past IETF efforts approaching the issue.



Update from version -00

- Reviewed the problem history for the host-driven solution (section 3) including references to Provisioning Domain (PvD)
- Expanded the list of requirements (section 4)
- About the available solutions (section 5)
  - Clarified that the cases Static ULA+NPT (section 5.3) and Static ULA+NAT66 (section 5.4) document operational deployment (and are not promoted by the authors)
  - Expanded discussion on shifting the problem to a different site (section 5.5)
  - Added discussion on application proxy (section 5.6)
- Reviewed conclusions.

Solutions considered

1. Static PI address space to the site. Routing announcements are propagated by carriers on behalf of the client.
2. Dynamic PA addresses distribution from carriers. It is the host's responsibility to properly choose the combination of a source address and the relevant next hop.
3. Static ULA with NPTv6 translation.
4. Static ULA with NAT66 translation.
5. Shifting Internet access resilience to a central site. A branch site is granted redundant connectivity to a central hub location where resilient Internet connectivity is handled.
6. Application proxy.

Solutions Considerations

	Requirement	PI	PA	ULA+NPT	ULA+NAT
1	Carriers Resiliency	+	+	+	+
2	End-to-End Connectivity	+	+	+/-*1	-
3	Internal Connectivity	+	+	+/-*2	+/-*2
4	Convergence Speed	+	+/-*3	+	+
5	Complex Topology Support	+	-	+/-*4	+
6	Subscriber-only Services	-	-	+/-*5	+/-*5
7	Traffic Steering on Router	+/-*6	-	+	+
7	Traffic Steering on Host OS	-	-	-	-
7	Traffic Steering on Application	-	-	-	-

Reasons for partial support:

*1. It permits initiating connectivity in any direction but address references in the application layer would need special treatment like ALG or STUN

*2. It is due to the complexity involved in promoting the ULA address space above IPv4 in the [SASA] policy table of hosts

*3. HNCP, DHCP-PD not been adopted by the market but needed for prefix deprecation propagation over a complex site

*4. It is not possible (on real products) to get bigger than /64 external prefix in the mobile environment

*5. It needs a routing announcement as “Routing Information Options” of Route Preferences which is not widely supported

*6. High complexity in organizing the steering of incoming traffic. NAT/NPTv6-based solutions connect ingress traffic steering to egress more simply

Resulting order of preference

- On the pure technical perspective, “PI” is preferred over “PA” that is preferred over “ULA+NPT” that is preferred over “ULA+NAT”.
- Many other non-technical requirements could be added to the table that may change the decision logic (for example, NAT may be perceived as security or regulatory requirement).
- If IPv6 end-to-end connectivity is a value then only “PI” or “PA” solutions are acceptable.
  - Then, network owners have to undertake additional steps such as getting a PI prefix from a RIR or LIR, and paying a premium for the advertisement of the PI prefixes through the carriers
- If this is deemed acceptable then the PI-based solution is preferable: simple, reliable, and scalable.
  - However, this may create a burden for Internet routing.
- If not, then PA may be the solution of choice, even with all the restrictions and complexities discussed in section 5.2.

- If end-to-end connectivity is not a necessity, and may even be undesired, ULA+NPTv6 satisfies a great amount of requirements, apart from cases where NAT66 is a strict (non-technical) requirement or the site has a combination of complex topology and mobile connectivity (problematic due to the small assignments on the WAN side and the 1:1 mechanism of NPTv6).

Conclusion and next steps

- The draft has received quite a good amount of comments. Please continue to review and provide your feedback
- In particular, we'd like to converge on the list of available solutions based on the draft's scope (site level)
  - MPTCP and MPQUIC seem applicable to a single node, not to the site

Thank you