IPv6-Mostly Networks Deployment and Operations Considerations

draft-link-v6ops-6mops-00

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Motivation

- Follow-up on “Mission Possible” IETF118 presentation
- Documenting successful IPv6-Mostly deployments.
  - What we’ve done
  - How
  - Why
  - What we wish we knew

Document Structure: Overview

- What is IPv6-mostly network?
- “IPv6-only capable endpoint”
- IPv6-only and IPv4-enabled hosts coexistence
  - DHCPv4 Option 108
  - Static or RADIUS-provided ACLs blocking IPv4
- Access to IPv4-only destinations
  - 464XLAT
  - PREF64
  - DNS vs DNS64

DNS vs DNS64

DNS64 is used for:

- 464XLAT prefix discovery (RCF7050)
  - PREF64 in RAs should be used instead
- IPv6-only devices w/o CLAT
  - Breaks DNSSEC
  - Does Not work if hosts/applications use custom resolvers
  - Some applications do not work anyway

Most implementations enable Option 108 and clat together

DNS64: if unmanaged devices w/o PREF64 & CLAT support are present

Document Structure (contd.): Solution Benefits

Compared to Dual-Stack

- Reduced IPv4 Consumption
- Simplified Operations
- Reduced Dependency on DHCPv4

Compared to IPv6-Only

- Scalability
- Simplicity
- Optimized IPv4 Consumption
- Problem Visibility
- Incremental Migration

Document Structure: Incremental Rollout

- Drastically increased visibility and impact for IPv6 issues
- Per-Device and Per-Subnet Incremental Rollout
  - Devices sending 108 unconditionally: per-subnet
  - If option 108 can be turned on/off: per-device
- Rollback speed: controlled by Option 108 value
- Opt-in and Opt-out
  - Start with opt-in, move to opt-out
  - Keep a “secret” dual-stack network as a fallback

Document Structure: Operational Considerations

- Address Assignment Policy
  - All existing CLAT implementation require SLAAC
- Extension Headers
  - At least Fragments and ESP SHOULD be permitted
- Typical Issues
  - Not about implementation bugs
  - List of things we wish we knew

Document Structure: Issues

Hosts with disabled/broken IPv6

Ensure that IPv6 is enabled/operational

Network Extension

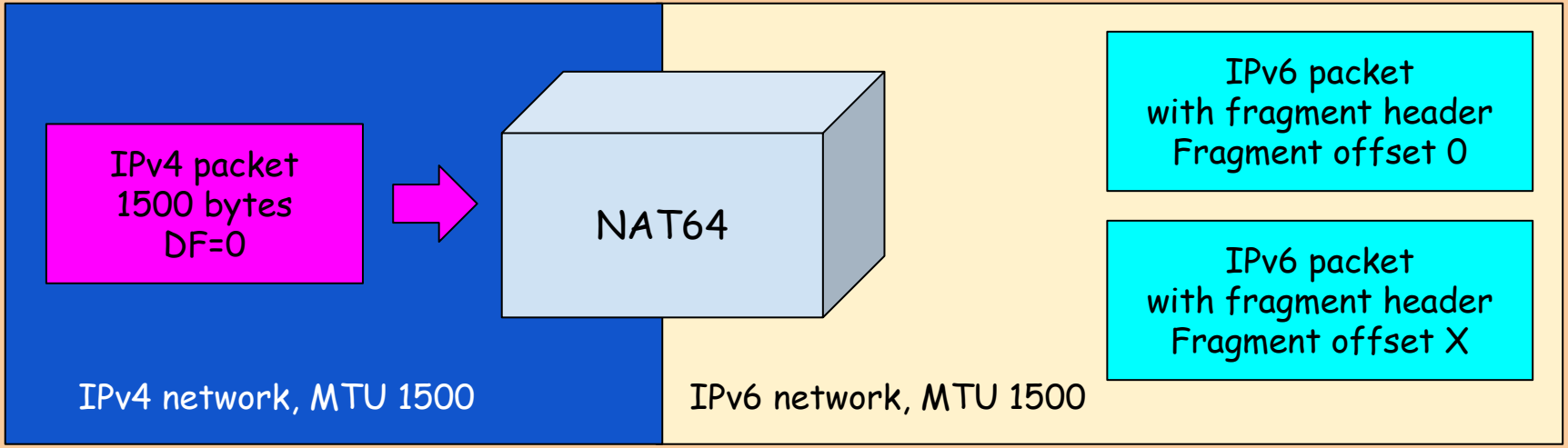
Hosts extending network downstream using NAT44, can't do it anymore

Solution documented in draft-ietf-v6ops-dhcp-pd-per-device

Multiple IPv6 addresses per device

Solution documented in draft-ietf-v6ops-dhcp-pd-per-device

Fragmentation



Caveats:

some NAT64 platforms use "1280" as a default size for translated packets instead of IPv6-only interface MTU.

Issues: Custom DNS Configuration on Devices

Devices/systems with custom DNS config (ignoring network-provided servers) can not use RFC7050 to discover the NAT64 prefix.

- Applications using their own resolvers
- Manual DNS configuration (public DNS servers)
- Users running their own resolvers

Administrators SHOULD enable PREF64 in RAs

Representation of IPv6 addresses by CLAT

How to translate source addresses of IPv6 intermediate hops (between CLAT and PLAT)?

Some implementations use reserved address space.

Questions:

- Do we need a standardized way?
- Shall it go to the CLAT draft?

Question? Comments?

Adoption?