# NAT-PT Replacement Comparison

Based on
draft-wing-nat-pt-replacement-comparison-02
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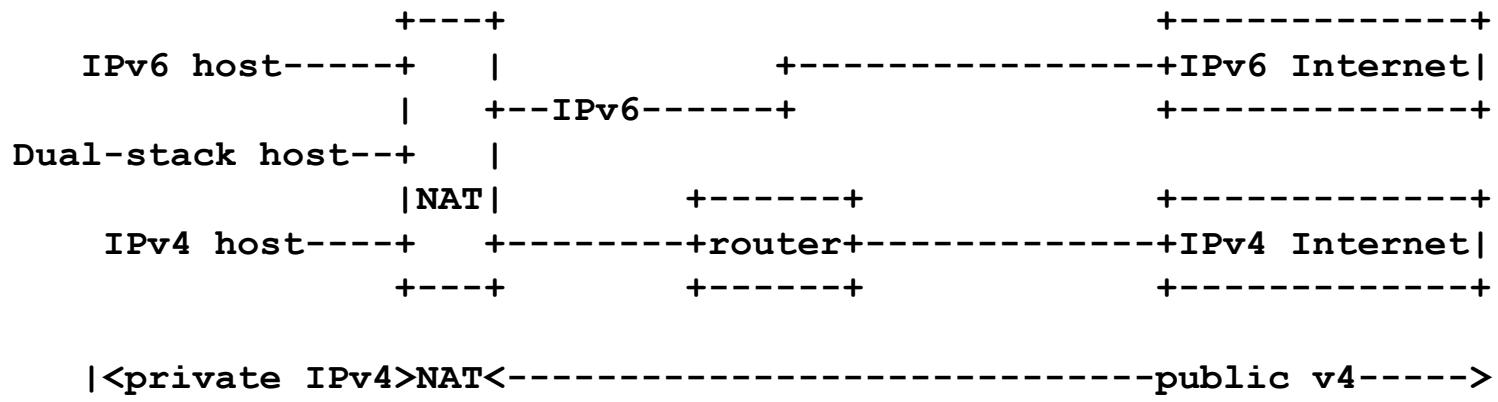
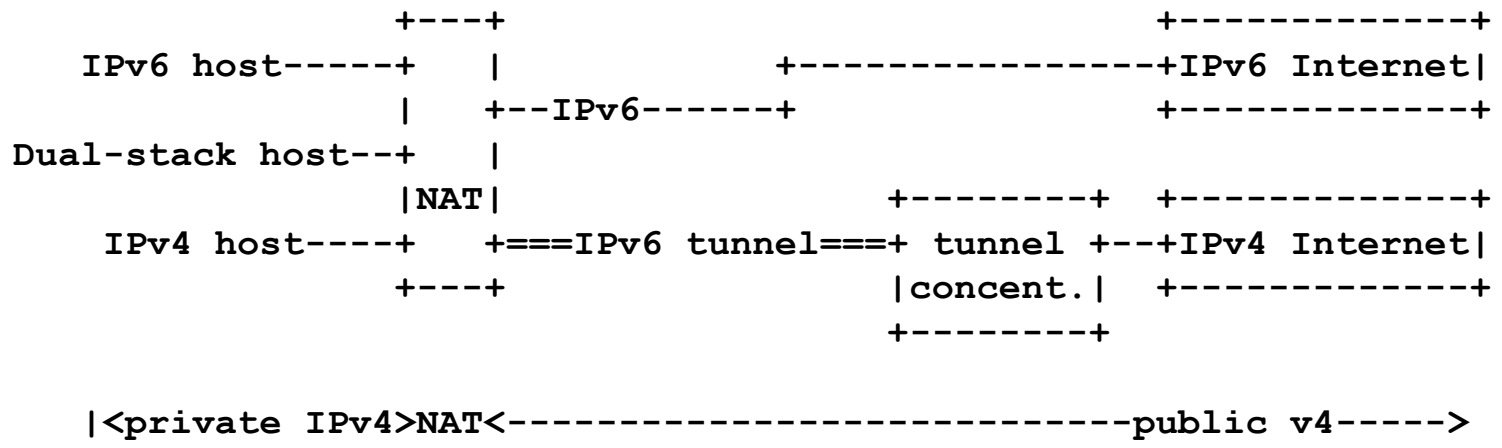
# Agenda, October 1

- Summary of today's proposals – IPv4 subscribers
  - Address + Port (A+P)
  - Stateless Address Mapping (SAM)
  - Dual-Stack Lite (DS-Lite)
  - (NAT444)
- Changed Network Elements

# Address + Port (A+P): IPv4 ISP



# Address + Port (A+P): IPv6 ISP




(this slide has been corrected from what was presented on October 1)

# Stateful Address Mapping: SAM-CPE

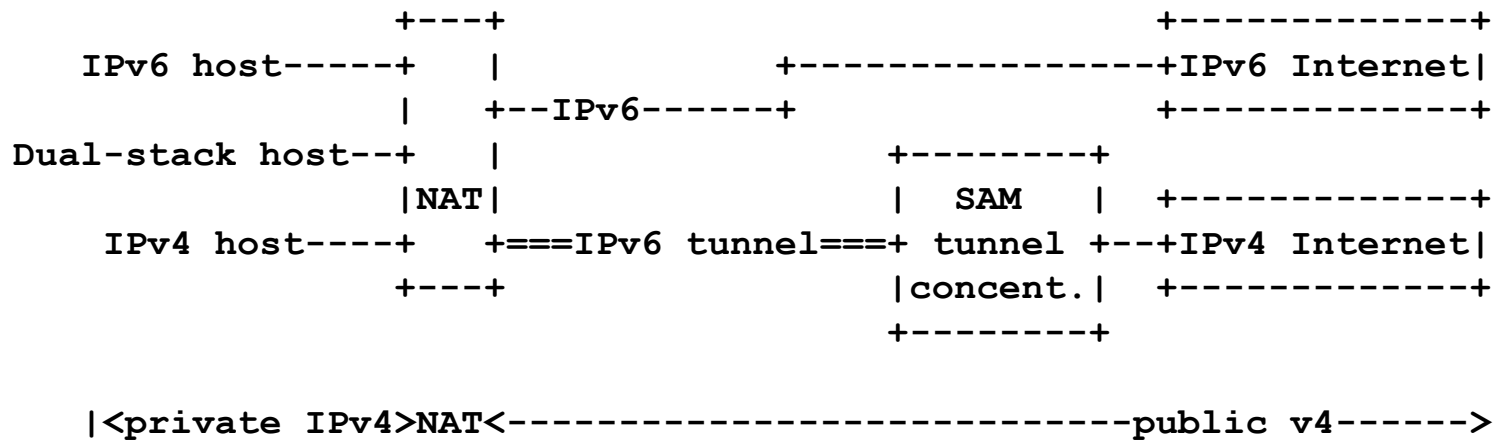
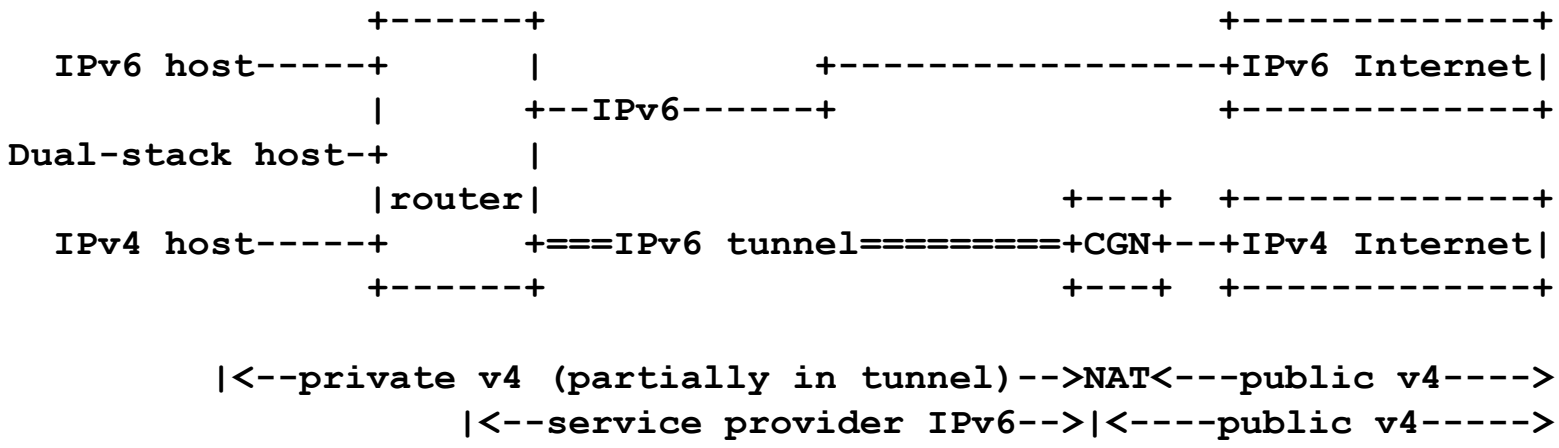



Figure 3: SAM-CPE, tunnel between CPE and tunnel concentrator

# Dual-Stack Lite (DS-Lite)



# Network Element Changes

| Proposal | Subscriber hosts w/CPE | Subscriber hosts w/o CPE | CPE router | ISP Network |
|---|---|---|---|---|
| **A+P-v4** | Dual-stack | No change[1] | A+P support | destination port routing |
| **A+P-v6** | Dual-stack | No change[1] | A+P support | tunnel concentrator |
| **SAM-CPE** | Dual-stack | N/A | SAM support | tunnel concentrator |
| **NAT444** | IPv4 | No change | No change | CGN (NAT44) |
| **DS-Lite router** | Dual-stack | N/A | DS-Lite support | CGN with tunnel concentrator |

[1] if CPE doesn't do A+P, ISP would need CGN

# v6 hosts accessing v4 Internet

| Proposal | ISP's Internal Network | DNS Impact | NAT location |
|---|---|---|---|
| **A+P-v4** | IPv4 destination port routing | No change | Subscriber (NAT44)[1] |
| **A+P-v6** | IPv4/IPv6 tunnel | No change | Subscriber (NAT44)[1] |
| **SAM-CPE** | IPv4/IPv6 tunnel | No change | |
| **NAT444** | No change | No change | CGN (NAT44) |
| **DS-Lite router** | IPv4/IPv6 tunnel | No change | CGN (NAT44) |

[1] if CPE doesn't do A+P, ISP would need CGN

# v4 hosts accessing v4 Internet

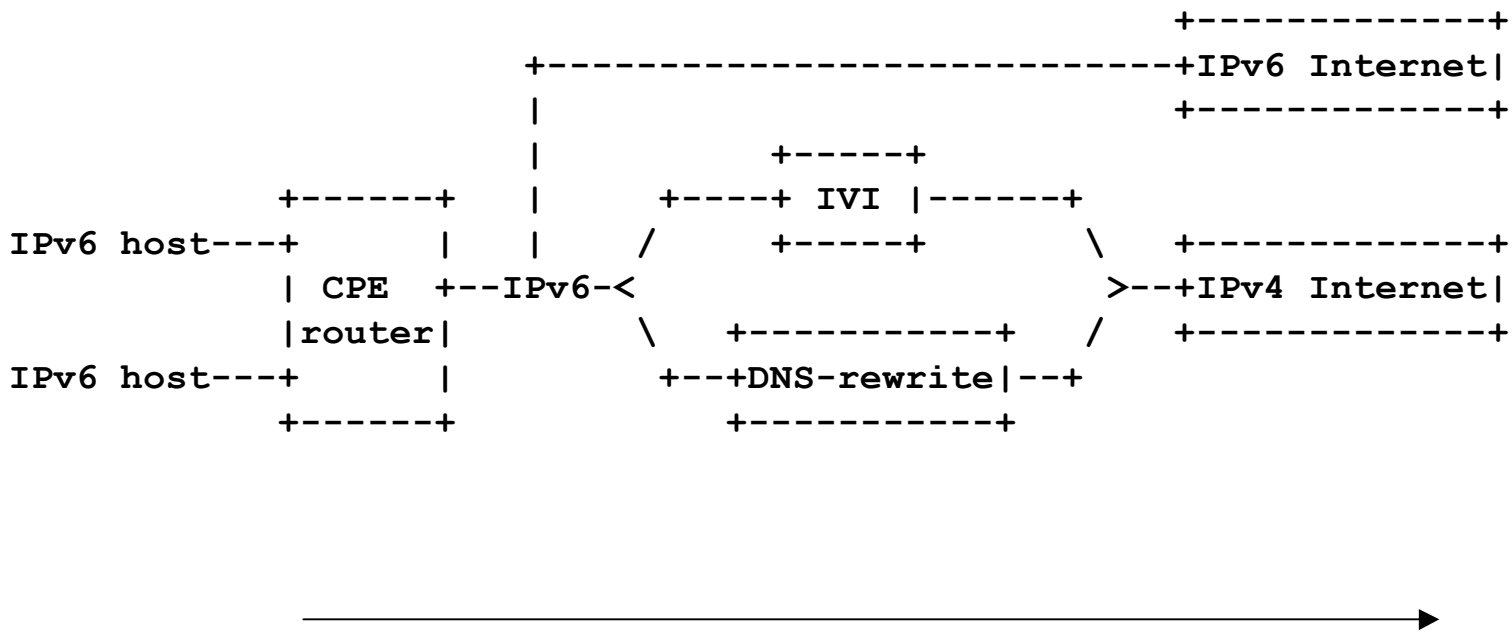
| Proposal | CPE router | ISP's Internal Network | Service Provider Equipment |
|---|---|---|---|
| **A+P-v4** | IPv6 support + A+P NAT44 | IPv4 and IPv6 | Destination port routing |
| **A+P-v6** | IPv6 support + IPv4/IPv6 tunnel + A+P NAT44 | IPv6 | IPv6 tunnel termination |
| **SAM-CPE** | IPv6 support + IPv4/IPv6 tunnel + NAT44 | IPv6 | IPv6 tunnel termination |
| **NAT444** | No change | Multi-realm IPv4 | CGN (NAT44) |
| **DS-Lite router** | IPv6 support + IPv4/IPv6 tunnel | IPv6 | IPv6 tunnel termination, CGN (NAT44) |

# End

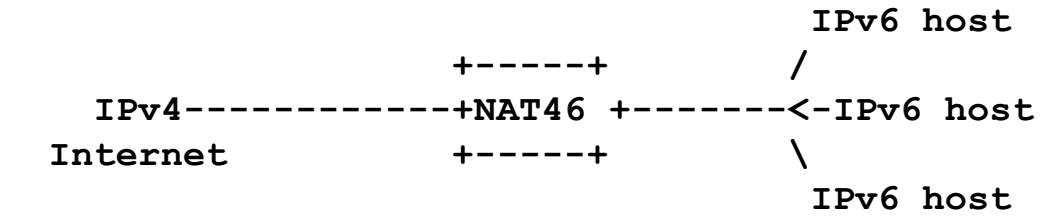
# Agenda, October 2

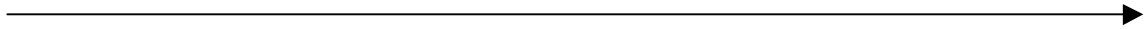
- Summary of Proposals – IPv6 subscribers
  - IVI, Scenario 3, Scenario 5
  - NAT6, Scenario 5
  - NAT64, Scenario 3, Scenario 5
  - (NAT-PT, Scenario 3)
  - sNAT-PT, Scenario 3, Scenario 5
- Changed Network Elements – all proposals

# IVI, Scenario 3

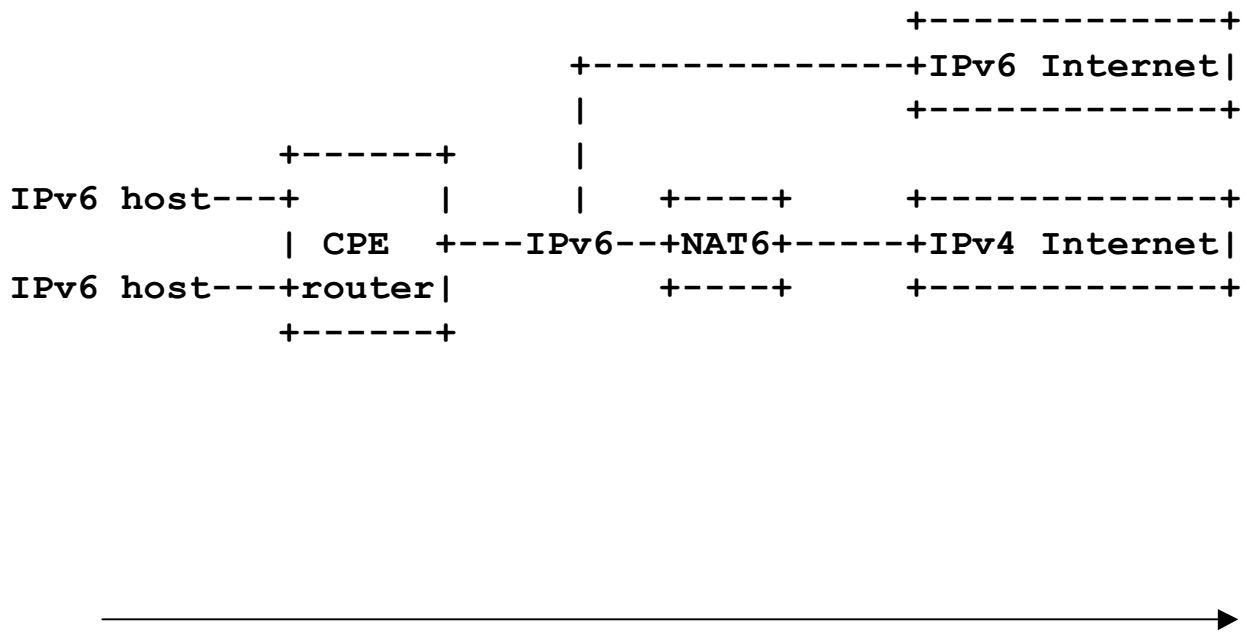


# IVI, Scenario 5

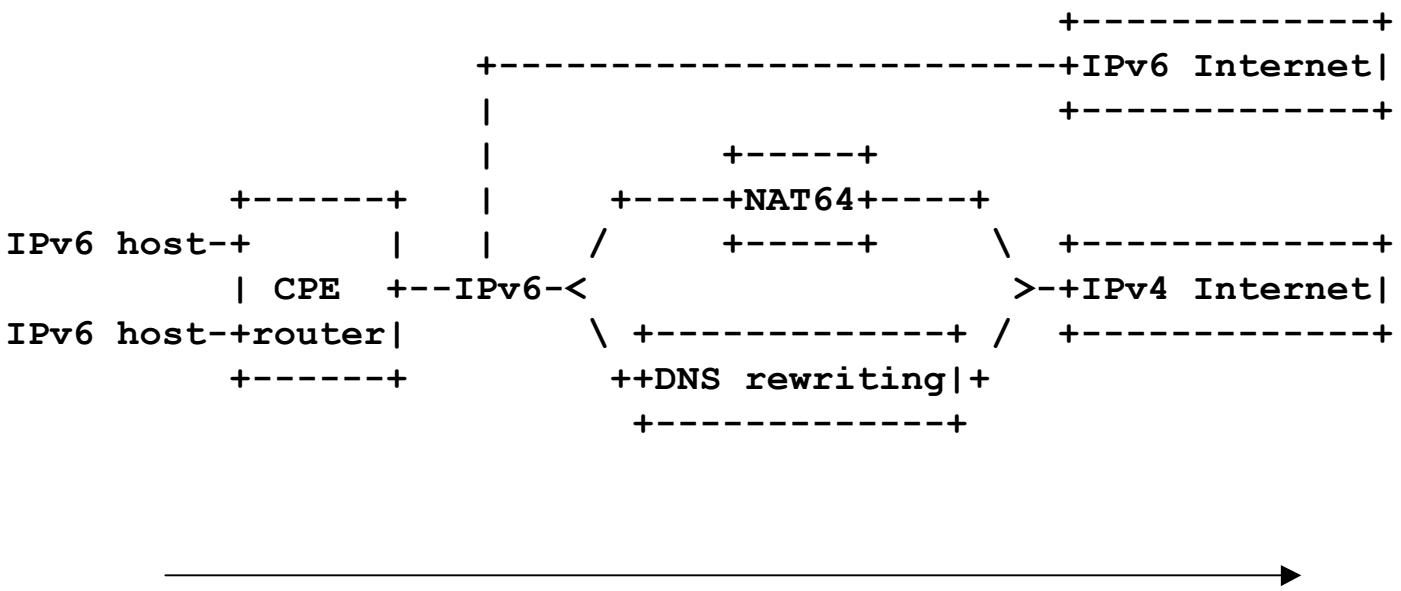


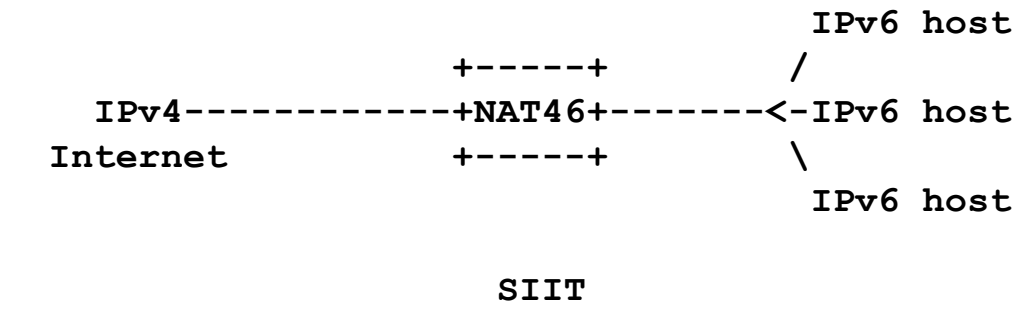
# NAT6, Scenario 3

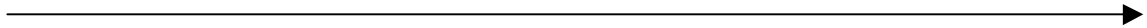


# NAT64, Scenario 3

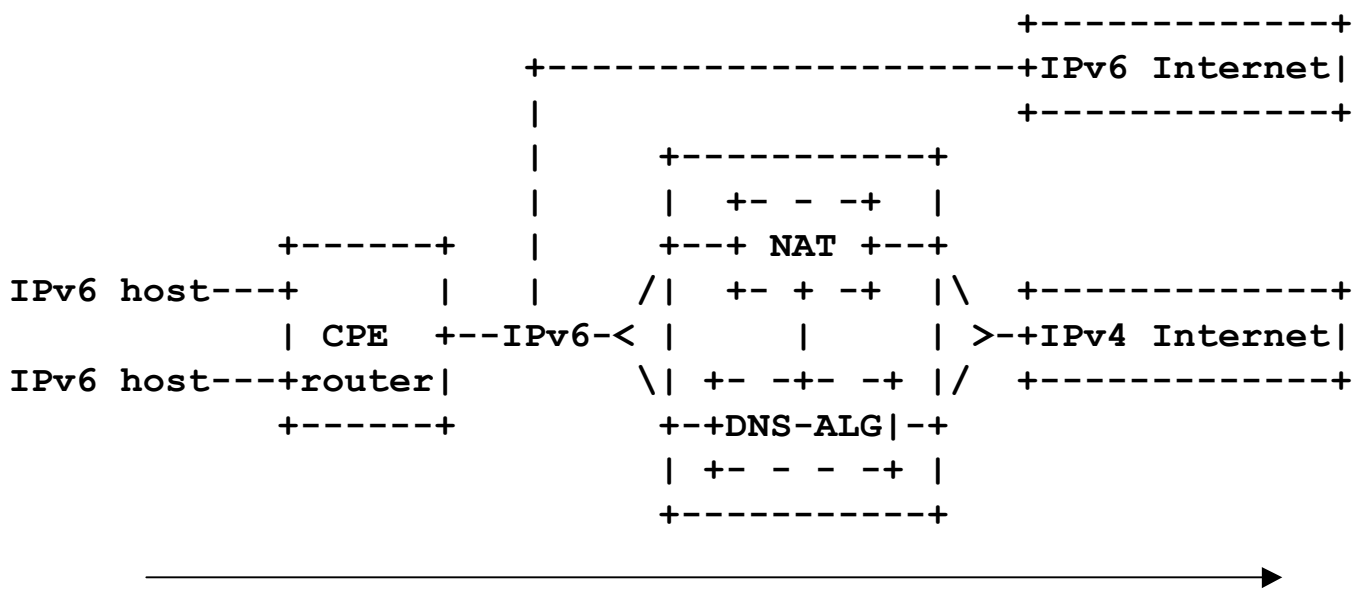


# NAT64, Scenario 5

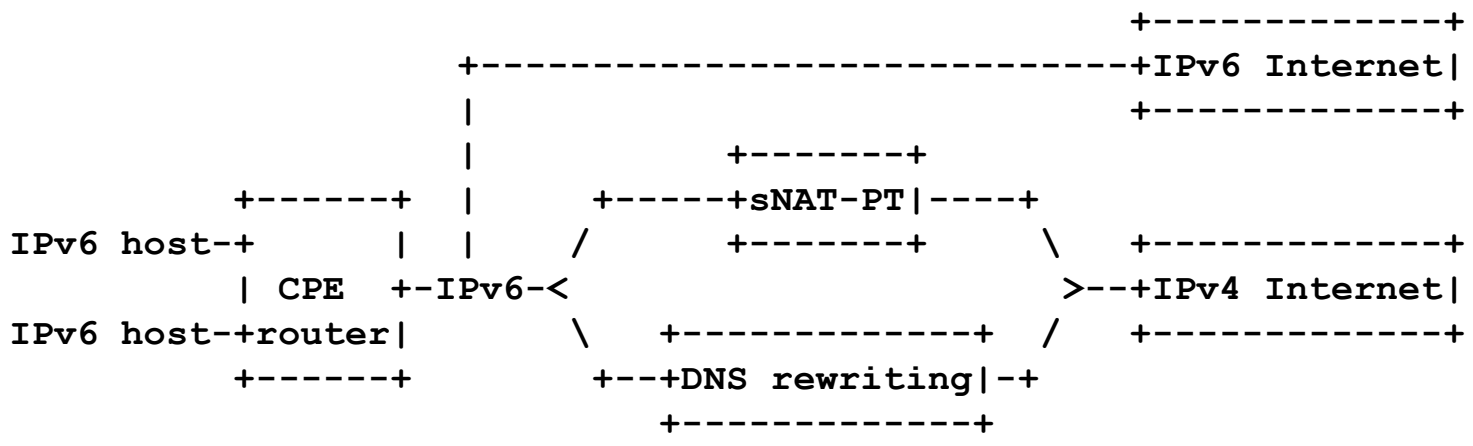


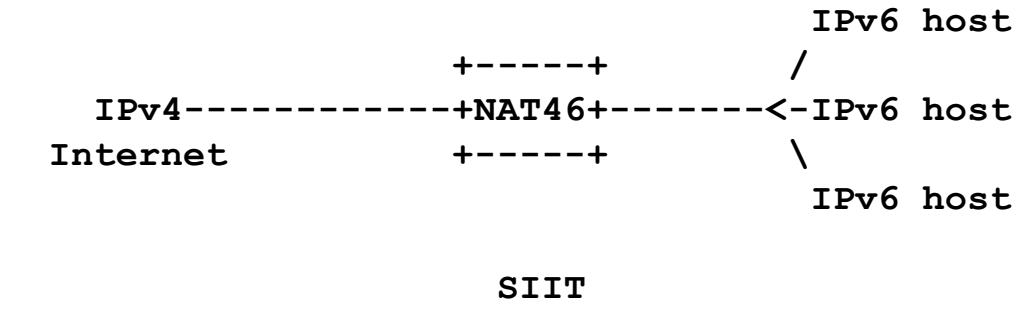
# (NAT-PT, Scenario 5)

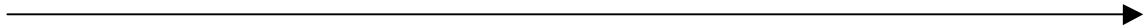


# sNAT-PT, Scenario 3



# sNAT-PT, Scenario 5



# Changes: IPv4/IPv6 -> IPv4

| Proposal | Subscriber Devices w/CPE | Subscriber Devices w/o CPE | CPE Router | ISP Network |
|---|---|---|---|---|
| A+P-V6 | V4/v6/dual | V4/v6/dual (1) | V4/v6 & A+P | V4/v6 encapsulation |
| SAM-CPE | V4/v6/dual | (not applicable) | V4/v6 & SAM | tunnel concentrator |
| SAM-host | (not applicable) | APBR CPE | V4/v6 & SAM | tunnel concentrator |
| SAM-HC | V4/v6/dual with SAM support | (not applicable) | V4/v6 & SAM | tunnel concentrator |
| NAT444 | v4 | v4 | no change | NAT v4v4 |
| DS-Lite router | V4/v6/dual | (not supported; use DS-Lite host) | DS-Lite CPE | NAT v4v4 w/tunnel |
| DS-Lite host | (not supported; use DS-Lite router) | DS-Lite v6 | no change | NAT v4v4 w/tunnel |
| IVI | v6 | v6 | v6 | AFT + DNS rewriting |
| NAT6 | v6 | v6 | v6 | AFT |
| NAT64 | v6 | v6 | v6 | AFT + DNS rewriting |
| NAT-PT | v6 | v6 | v6 | AFT + DNS-ALG |
| sNAT-PT | v6 | v6 | v6 | AFT + DNS rewriting |

# High-Level Technologies used

## IPv6 Hosts accessing the IPv4 Internet

| Proposal | ISP's Internal Network | DNS Impact | NAT type |
|---|---|---|---|
| A+P | IPv4/IPv6 tunnel encap/decap | no DNS rewriting | NAT44 (CPE) |
| SAM | IPv4/IPv6 tunnel | no DNS rewriting | NAT44 (CPE) |
| DS-Lite router | IPv4/IPv6 tunnel | no DNS rewriting | NAT44 (CGN) |
| DS-Lite host | IPv4/IPv6 tunnel | no DNS rewriting | NAT44 (CGN) |
| NAT444 | (v6 not supported) | no DNS rewriting | (v6 not supported) |
| IVI | v4 AFT, native v6 address | DNS rewriting | AFT (CGN) |
| NAT64 | v4 AFT, native v6 address | DNS rewriting | AFT (CGN) |
| NAT-PT | v4 AFT, native v6 address | DNS-ALG | AFT (CGN) |
| sNAT-PT | v4 AFT, native v6 address | DNS rewriting | AFT (CGN) |

# High-Level Technologies used

## IPv4 Hosts accessing the IPv4 Internet

| Proposal | CPE | ISP's Internal Network | Service Provider Equipment |
|---|---|---|---|
| A+P-V6 | IPv6 support + IPv4/IPv6 tunnel + A+P NAT44 | IPv6 | IPv6 tunnel encap/decap |
| SAM-CPE | IPv6 support + IPv4/IPv6 tunnel + NAT44 | IPv6 | IPv6 tunnel termination |
| DS-Lite router | IPv6 support + IPv4/IPv6 tunnel | IPv6 | IPv6 tunnel termination, NAT44 (CGN) |
| DS-Lite host | IPv6 support (if using DS-Lite IPv6 tunneling) | IPv6 (if using DS-Lite IPv6 tunneling) | IPv6 tunnel termination, NAT44 |
| NAT444 | no change | multi-realm IPv4 | NAT44 (CGN) |

# End