464XLAT
Combination of Stateful and Stateless Translation
draft-ietf-v6ops-464xlat

IETF 84  Sunset4 WG

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**Context: The Economic Problem**

**Scarcity** is the fundamental economic problem of having humans who have unlimited wants and needs in a world of limited resources. (Wikipedia, http://en.wikipedia.org/wiki/Scarcity)

**Scarcity** is the fundamental Network Engineering Problem of having nodes who have unlimited connectivity wants and needs in a world of limited addressing resources.

**Scarcity** is 4 Billion IPv4 addresses and 50 Billion networked nodes http://www.ericsson.com/campaign/opportunitysupportsystems/newsfeed/posts/15-heading-towards-50-billion-connections/

**Scarcity** is #3 and #4 wireless providers in the USA use IPv4 “squat space” for users, and #1 and #3 launched LTE without IPv6

Observation – IPv4 has run out, and IPv6 is not ready
What is 464XLAT?

464XLAT provides limited IPv4 connectivity across an IPv6-only network by combining existing and well-known stateful protocol translation RFC 6146 in the core and stateless protocol translation RFC 6145 at the edge.
What is 464XLAT? (cont.)

• **What it is**
  – Combined RFC 6145 and RFC 6146
  – Easy to deploy and available today, commercial and open source shipping product
  – Effective at providing basic IPv4 service to consumers over IPv6-only access networks
  – Efficient use of very scarce IPv4 resources

• **What it is NOT**
  – A perfect replacement for IPv4 or Dual-stack service
1. **Minimal IPv4 resource requirements, maximum IPv4 efficiency through statistical multiplexing**
   - Stateful NAT64 translation in PLAT. Each 1 IPv4 can mask \( n \times 64,000 \) flows.
   - ISPs can efficiently and effectively share limited IPv4 global address pool.

2. **No new protocols required, quick deployment**
   - It is only necessary to use standard technologies based on RFC already published.
   - Most of ISPs do not have a lot of time to make a new protocol
   - Multi-vendor inter-op already proven (Cisco, Juniper, A10, and F5 as a PLAT)
3. IPv6-only networks are simpler and therefore less expensive to operate

- When combined with DNS64, ISP can provide sharing IPv4 address and IPv4/IPv6 translation at same time. (Less NAT than NAT444)

- ISPs can do IPv6 traffic engineering and billing without deep packet inspection devices.

- If the other ISPs operate PLAT as PLAT providers, ISPs for IPv6 consumers can independently do IPv6 traffic engineering on common backbone routers.

- Single stack network operations

- Limits the need to buy IPv4 addresses
## Timeline of 464XLAT draft (It has matured.)

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<td>WGLC in Sunset4 or v6ops?</td>
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Next steps

• Publish as Sunset4 draft?

• Rough Consensus?

• WGLC?
Backup Slides
Uniqueness From Softwires WG

- Does not rely on DHCPv6 which is not supported in UMTS / LTE
- Available host / router implementations
- Does not rely on fixed IP / port mappings, which are not feasible in very IPv4 constrained environments
- Does not require tunneling technologies which can breaking traffic engineering and charging policies
Network architecture

This architecture consists of CLAT and PLAT, which have applicability to wireline networks (e.g., FTTH) and mobile networks (e.g., 3GPP).
References

- **Android-CLAT** (CLAT code for Android)
  
  [https://android-review.googlesource.com/34490](https://android-review.googlesource.com/34490)

- **n900ipv6** (CLAT code for Nokia n900)
  
  [https://code.google.com/p/n900ipv6/wiki/Nat64D](https://code.google.com/p/n900ipv6/wiki/Nat64D)

- **464XLAT experiences in JPIX**
  
  [http://www.apricot2012.net/program/ipv6-conference](http://www.apricot2012.net/program/ipv6-conference)

- **NEC AccessTechnica CLAT for wireline.**
  - This CPE is used for JPIX trial service and WIDE Camp Spring 2012.
  - Multi-vendor interoperability already proven.
    (Cisco, Juniper, A10, and F5 as a PLAT)