

# 464XLAT

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

IETF 84 Sunset4 WG

M.Mawatari @ Japan Internet Exchange Co.,Ltd.

M.Kawashima @ NEC AccessTechnica, Ltd.

C.Byrne @ T-Mobile USA

# 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>)

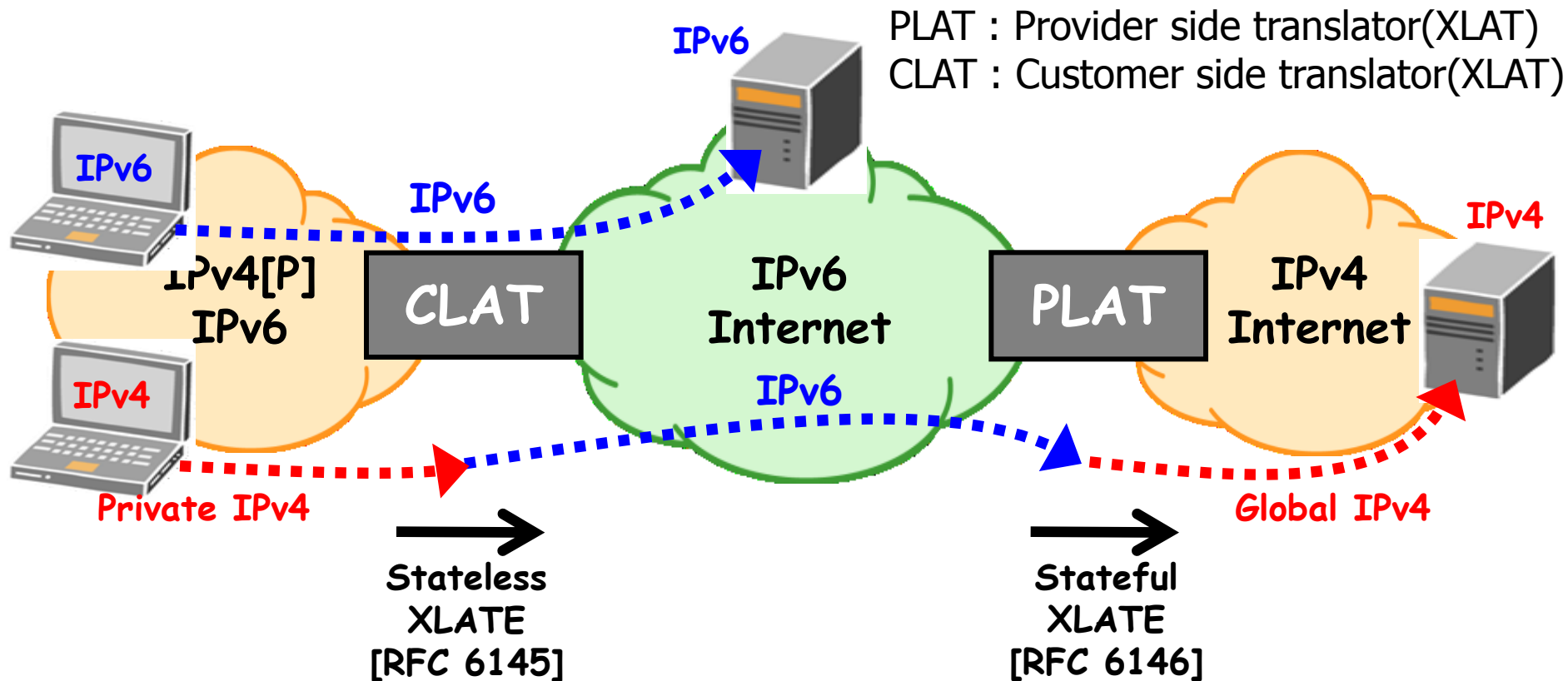
**Scarcity** is the fundamental **Network Engineering Problem** of having **nodes** who have unlimited **connectivity** wants and needs in a world of limited **addressing** resources.

**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

# Motivation and Uniqueness of 464XLAT

---

## **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.)

Timeline

2011/10/16	Published draft-mawatari-softwire-464xlat-00
2011/10/24	Published draft-mawatari-softwire-464xlat-01
2011/10/31	Published draft-mawatari-softwire-464xlat-02
2011/11/15	Discussed in softwire WG IETF 82
2012/01/15	Published draft-mawatari-v6ops-464xlat-00
2012/02/15	Published draft-ietf-v6ops-464xlat-00 as a WG draft
2012/03/12	Published draft-ietf-v6ops-464xlat-01
2012/03/26	Discussed in v6ops WG IETF 83
2012/04/17	Published draft-ietf-v6ops-464xlat-02
2012/05/08	Published draft-ietf-v6ops-464xlat-03
2012/06/25	Published draft-ietf-v6ops-464xlat-04
2012/07/03	Published draft-ietf-v6ops-464xlat-05
2012/07/30	Discussing in sunset4 WG IETF 84 (Just now!)
2012/08/xx	WGLC in Sunset4 or v6ops ?

## Next steps

---

- Publish as Sunset4 draft?
- Rough Consensus?
- WGLC ?

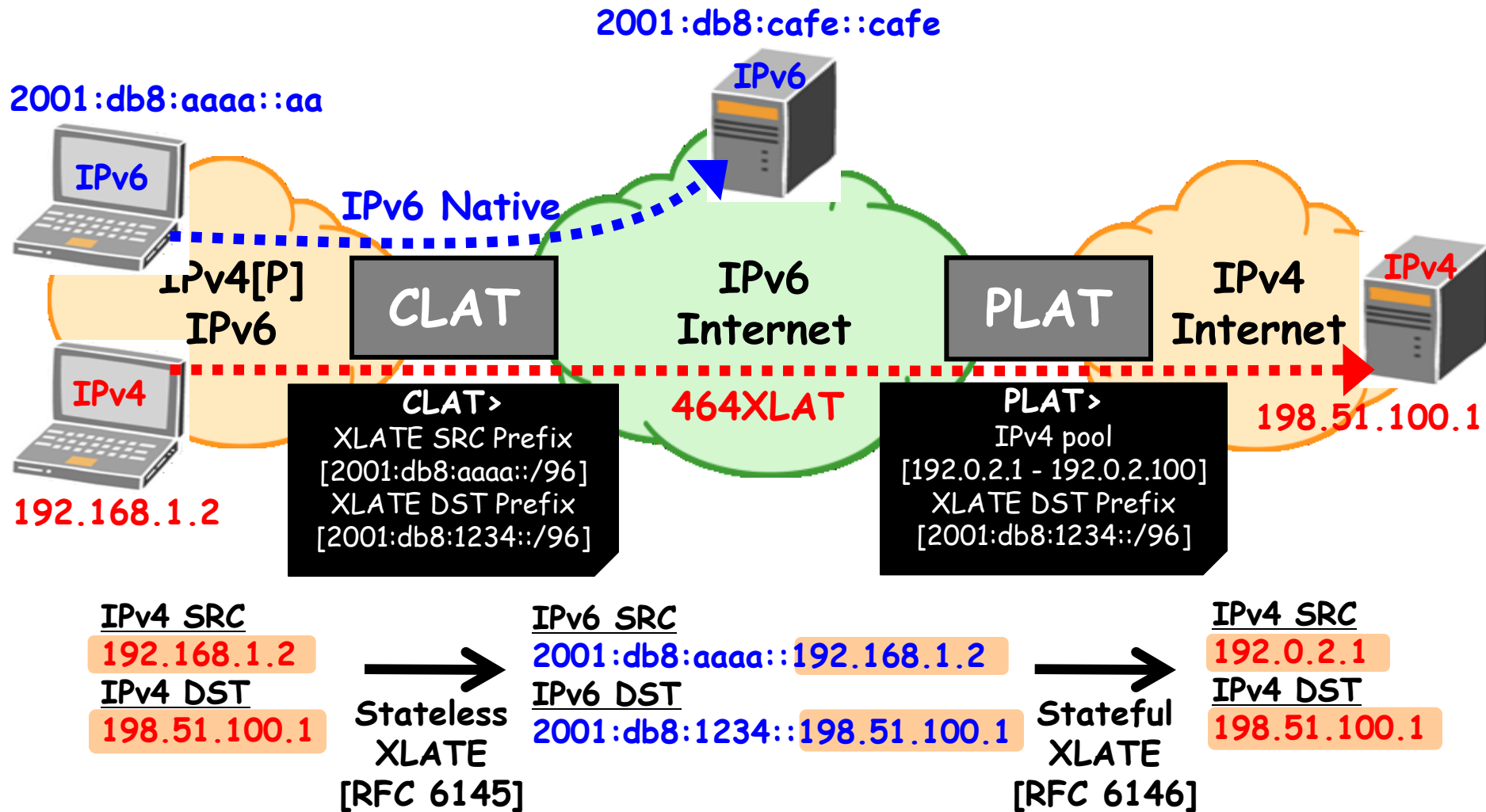


# Backup Slides

# 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 consist of CLAT and PLAT have the applicability to wireline network (e.g. FTTH) and mobile network (e.g. 3GPP).

# References

- Android-CLAT (CLAT code for Android)  
<https://android-review.googlesource.com/34490>
- n900ipv6 (CLAT code for Nokia n900)  
<https://code.google.com/p/n900ipv6/wiki/Nat64D>
- 464XLAT experiences in JPIX  
<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)



**NEC AccessTechnica  
CL-AT1000P**



**Juniper SRX Series**



**F5 BIG-IP Series**



**Cisco ASR 1000 Series**



**A10 AX Series**