

# IPv6-Only: An Unexpected Journey

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Problem: Running out of private IPv4 addresses

Not a solution: deploy IPv6

Solution: deploy IPv6-only



# Proof of Concept: Guest Network

## How:

Disabled IPv4 on GoogleGuest and wired guest vlans

Created GoogleGuest-IPv4 (+dedicated wired vlan) for fallback

Enable NAT64 and Google public DNS64

## Why:

a lot of mobile devices which are IPv6-only ready

# How Did It Go?

## Went Well:

50k+ devices on IPv6-only

Very few complains

Bugs fixed

A lot of IPv4 reclaimed

## Didn't Went So Well:

**Multiple SSIDs are confusing**

**Accidental use of IPv4**

**Issues are not reported**

The story was presented at IETF v6ops@ back in 2020 ([slides](#))

# What We Want for Global Rollout

IPv6-Only and IPv4-requiring devices coexist on the same network segment

IPv4 is provided as on-demand service

IPv6-Only devices work OK if/when move to IPv4-only network

# What If...

Client Indicates IPv6-only Capability

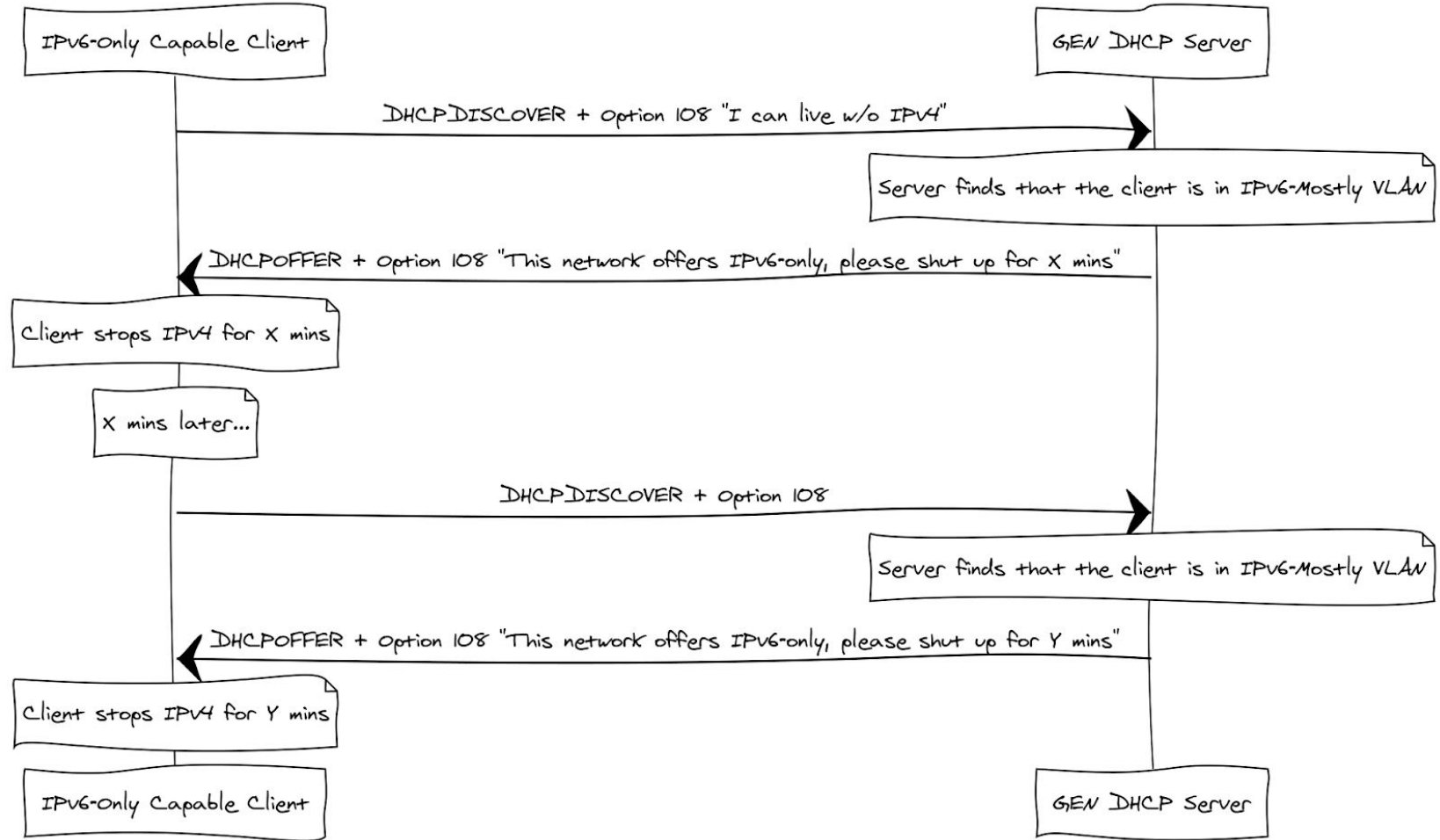
```
graph TD; A[Client Indicates IPv6-only Capability] --> B[Server checks if the given network supports IPv6-Only]; B --> C[IPv6-Only Capable client on IPv6-Only capable network  
No IPv4 allocated]; B --> D[All other cases:  
IPv4 Allocated];
```

Server checks if the given network supports IPv6-Only

IPv6-Only Capable client on  
IPv6-Only capable network  
No IPv4 allocated

All other cases:  
IPv4 Allocated

## We Need Something Better



## The Same Client on CORP Dual-Stack Segment

IPv6-Only Capable Client

GEN DHCP Server

The client connects to a dual-stack segment

DHCPDISCOVER + Option 108 "I can live w/o IPv4"

Server finds that the client is in normal dual-stack VLAN

DHCPOFFER "Here's an address for you"

DHCPREQUEST "I'm going to use that address"

DHCPACK "The address is yours"

IPv6-Only Capable Client

GEN DHCP Server



## The Same Client on External IPV4-Only Segment

IPv6-Only Capable Client

DHCP Server

The client connects to your home IPV4-only segment

DHCPDISCOVER + Option 108 "I can live w/o IPV4"

Server has no idea what Option 108 is...

DHCPOFFER "Here's an address for you"

DHCPREQUEST "I'm going to use that address"

DHCPACK "The address is yours"

IPv6-Only Capable Client

DHCP Server

# Solution Benefits

IPv6-Only and IPv4-requiring devices coexist on the same network segment

IPv4 is provided as on-demand service

IPv6-Only devices work OK if/when move to IPv4-only network

No noise traffic, so scalability issues

# <https://tools.ietf.org/html/rfc8925>

← → ↻ 🏠 🔒 tools.ietf.org/html/rfc8925

[\[Docs\]](#) [\[txt|pdf\]](#) [\[draft-ietf-dhc-...\]](#) [\[Tracker\]](#) [\[Diff1\]](#) [\[Diff2\]](#)

For this RFC, original HTML is available from the RFC-Editor: [RFC8925](#)

PROPOSED STANDARD

Internet Engineering Task Force (IETF)	L. Colitti
Request for Comments: 8925	J. Linkova
Updates: <a href="#">2563</a>	Google
Category: Standards Track	M. Richardson
ISSN: 2070-1721	Sandelman
	T. Mrugalski
	ISC
	October 2020

**IPv6-Only Preferred Option for DHCPv4**

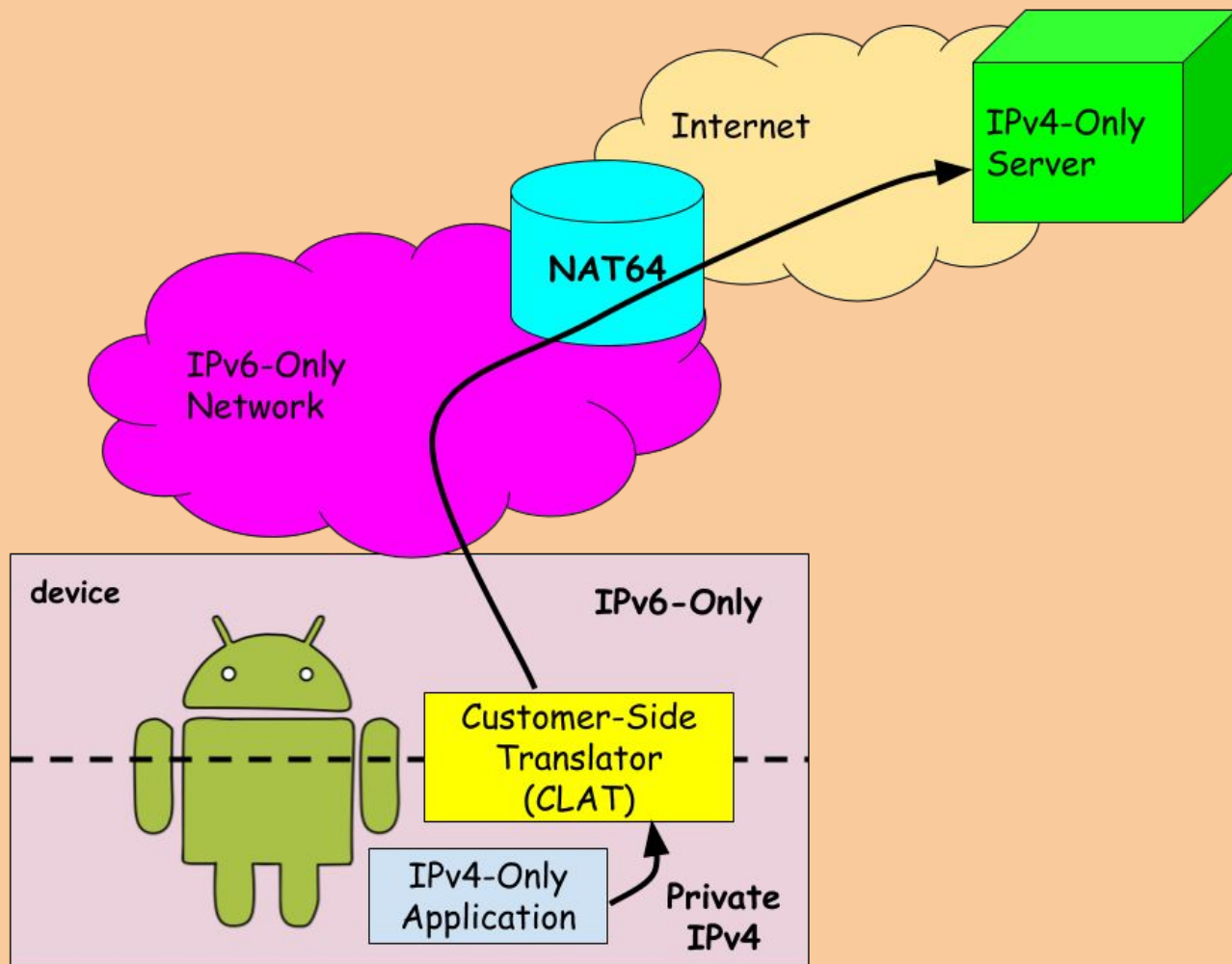
**Abstract**

This document specifies a DHCPv4 option to indicate that a host supports an IPv6-only mode and is willing to forgo obtaining an IPv4 address if the network provides IPv6 connectivity. It also updates [RFC 2563](#) to specify DHCPv4 server behavior when the server receives a DHCPDISCOVER not containing the Auto-Configure option but containing the new option defined in this document.

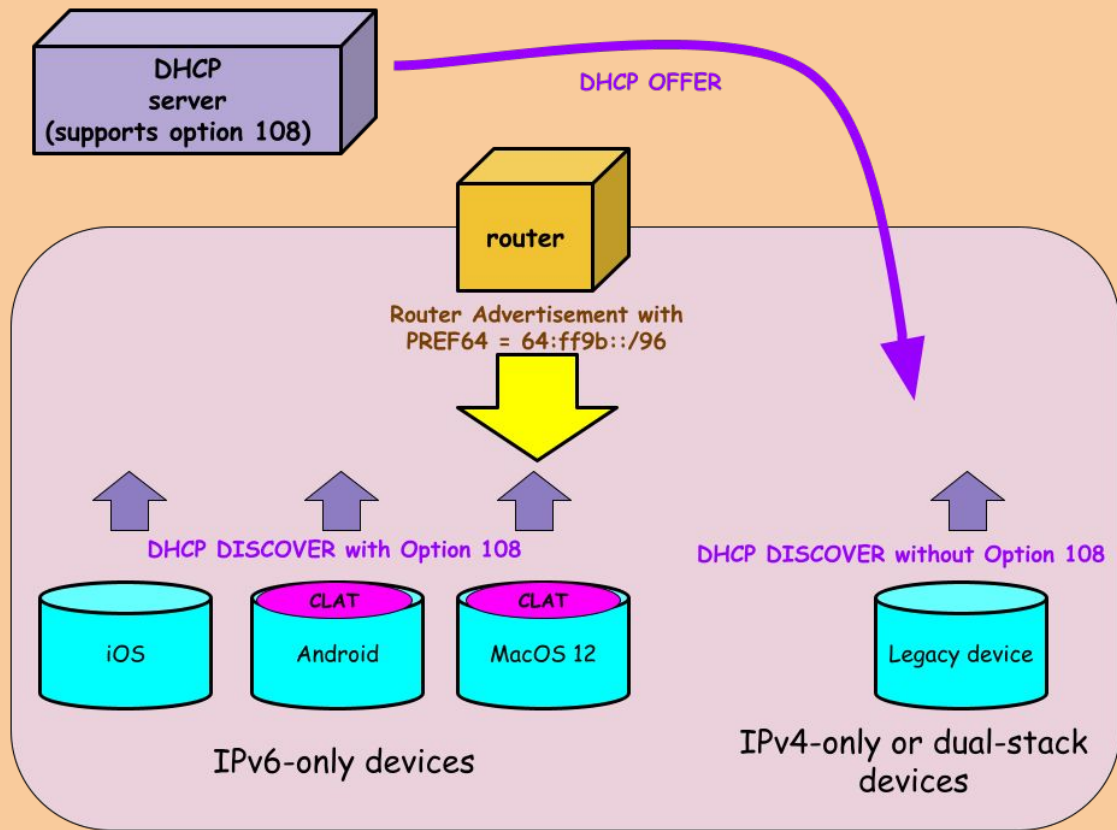
Status of This Memo

**IPv4-ONLY APPLICATIONS**

**WHAT YEAR IS IT**



# PREF64 (RFC8781) + DHCPv6 Option 108 (RFC8925)



Also deployed at RIPE85 Network: (see [presentation](#))



**THE OWLS ARE NOT  
WHAT THEY SEEM.**

# Lessons Learned

**Expectation:** 10+ years of IPv6 operational experience

**Reality:** dual-stack operational experience

**Expectation:** IPv6 works.

**Reality:** yeah...most of the time...

