Abstract

The IPv6 transition has been an ongoing process throughout the world due to the exhaustion of the IPv4 address space. The 464XLAT [RFC6877] provides a solution with limited IPv4 connectivity across an IPv6-only network, and the android system (version 2.3 and above) has already implemented the 464XLAT [RFC6877] and the the Prefix discovery solution [RFC7050]. However, the current 464XLAT architecture can only deal with the scenario with single PLAT in the network. When operator deploys multiple PLATs with different Pref64 prefixes, 464XLAT cannot cope with multiple prefixes for different destination addresses.

This document describes the architecture with multiple PLATs and also the deployment considerations.

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Table of Contents

1. Introduction .......................... 3
2. Terminology ........................... 3
3. Requirement of Multiple PLATs in 464XLAT ............ 3
4. Overall Architecture of multiPLATs in 464XLAT ............ 4
   4.1. Prefix Management Server .................. 4
   4.2. Enhanced CLAT for multiPLAT ................. 5
5. Deployment Considerations ........................ 6
   5.1. Prefix Management ......................... 6
   5.2. DNS64 Consistency ......................... 6
6. Security Considerations ........................ 6
7. IANA Considerations .......................... 6
8. Acknowledgements ............................ 6
9. References .................................... 7
   9.1. Normative References ....................... 7
   9.2. Informative References ..................... 7
Authors’ Addresses ............................ 7
1. Introduction

The exhaustion of the IPv4 address space has been a practical problem that providers are facing today. Network address migration to IPv6 is ongoing or upcoming throughout the world. The 464XLAT architecture uses IPv4/IPv6 translation standardized in [RFC6145] and [RFC6146]. It encourages the IPv6 transition by making IPv4 service reachable across IPv6-only networks and providing IPv6 and IPv4 connectivity to single-stack IPv4 or IPv6 servers and peers. The android system (version 4.3 and above) has already implemented the 464XLAT[RFC6877] and the Prefix discovery method in [RFC7050].

However, as described in section 6.3 [RFC6877], the CLAT will use the PLAT-side translation IPv6 prefix as the destination of all translation packets that require stageful translation to the IPv4 Internet. The Prefix Discovery method [RFC7050] cannot deal with the scenario when different PLATs are using with different Pref64 prefixes.

This document describes the 464XLAT architecture with multiple PLATs by combining with the existing solutions.

2. Terminology

This document use the terminologies defined in RFC6877 and RFC7050.

3. Requirement of Multiple PLATs in 464XLAT

As defined in RFC6147 [RFC6147], it allows DNS64 implementations to be able to map specific IPv4 address ranges to separate Pref64::/n prefixes. That allows handling of special use IPv4 addresses [RFC6890]. Therefore, operator may deploy multiple NAT64s (PLATs in 464XLAT) for different ranges of IPv4 servers. For example, one PLAT "A" is used when accessing IPv4-only servers in the data center, and a different PLAT "B" is used for Internet access. These two PLATs may have implemented different ALG types and different QoS treatment.

```
PLAT "A" ----- IPv4-only servers in a data center /
IPv6-only node---<
\
PLAT "B" ----- IPv4 Internet
```

Figure 1: Use case of MultiPLAT

In this use case, one end user would use multiple Pref64 prefixes for
different destinations.

Another use case to deploy multiple PLATs is for load balancing. For example, PLAT "A" would serve approximately half of the subscribers in one network, while PLAT "B" would serve the other half.

```
PLAT "A" ----- half of the subscribers
IPv6-only node---<
PLAT "B" ----- the other half of the subscribers
```

Figure 2: Use case of MultiPLAT

In this use case, one end user would still get one Pref64 for all destinations, but it still needs a management system to allocate different Pref64 prefixes for different users.

4. Overall Architecture of MultiPLATs in 464XLAT

The overall architecture of multiPLATs in 464XLAT is depicted as following. It consists of a Prefix Management Server, enhanced CLAT, and multiple PLATs. The PLAT in this architecture has no difference between 464XLAT in RFC[RFC6877].

```
+-----------------+
|----|Pref Mangt Server|
+-----------------+

| CLAT |----------------+|PLAT1+-----| network1 |
| +-----+            \    +-----+     /        
|       |             \  |       |     /        
|       |             |   |       |     /        
|       +-----+     /        
|       +-----+     /        
|       |          +----------+
|       +-----+     /        
|       +-----+     /        
|       |          +----------+
|       +-----+     /        
|       +-----+     /        
|       |          +----------+
|       +-----+     /        
|       +-----+     /        

Figure 1: Architecture of IPTM
```

4.1. Prefix Management Server

The Prefix Management Server includes the following modulars as in Figure2.
It would be configured with the policy to allocate multiple Pref64s. There are be different policies to apply. For example, it may map specific IPv4 destination address ranges to separate Pref64 prefixes, or map specific IPv6 source address ranges to separate Pref64 prefixes, or map both destination IPv4 address and source IPv6 address to Pref64 prefixes. The policy in Prefix Management Server should be consistent with PLAT deployment policy.

The prefix discovery method should be able to cope with multiple Pref64 prefixes. It may implement PCP based prefix discovery method[RFC7225] to allocate multiple Pref64 prefixes.

### 4.2. Enhanced CLAT for multiPLAT

In addition to existing CLAT, the enhanced CLAT for multiPLAT should also implement the following modulars:

The prefix discovery method should be consistent with the one in the Prefix Management Server. The Prefix Management modular will extract the Pref64 from the prefix discovery procedure multiple Pref64 prefixes and the v4addrRange Management modular will store the corresponding IPv4 address ranges. The prefix discovery method will get multiple Pref64 prefixes after the authentication and IPv6
address allocation process. Then, the CLAT will use the prefix as the destination for specific IPv4 address ranges.

The translation and DNS modular is the same with the traditional XLAT in [RFC6877].

5. Deployment Considerations

5.1. Prefix Management

The prefix management modular is important for multiPLATs 464XLAT. However, since it should compare the destination address range with each packet in CLAT, it might have effect on the performance efficiency in the client. So, operators should limit the number of address ranges, and aggregate the addresses into a larger address range.

Besides, there might also be a maximum configuration limit in CLAT on the number of Pref64 prefixes and the number of address ranges. When the number of address ranges exceeds the limit, the CLAT may ignore the following Pref64 prefixes and use a default prefix for the rest of destinations. However, this may cause issues for unexpected results.

5.2. DNS64 Consistency

464XLAT does not require DNS64 [RFC6147] when IPv4 host sends IPv4 packets to reach IPv4 servers. But 464XLAT networks may use DNS64 to enable single stateful translation [RFC6146]. In this case, the configuration policy in DNS64 should be consistent with Prefix Management Server. For example, how to map different IPv4 address ranges to Pref64 prefixes and IPv6 prefixes to Pref prefixes.

6. Security Considerations

TO BE COMPLETED

7. IANA Considerations

This document has no IANA actions.

8. Acknowledgements

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9. References

9.1. Normative References


9.2. Informative References


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