464XLAT Optimization for CDNs/Caches

draft-palet-v6ops-464xlat-opt-cdn-caches

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Problem Statement

• IPv4-only devices flows to dual-stack CDNs/Caches are terminated as IPv4, which means extra translations and the subsequent unnecessary overload

• In equivalent IPv4-only CGN use cases, the CDNs provide “private” addresses (typically 100.64.0.0/10) to avoid exactly the same issues
Typical 464XLAT Deployment
IPv6-Capable device

end-to-end IPv6 flow
IPv4-only device
IPv4-only device (optimized)
In Summary

Optimal!

Dual-Stack User → ISP IPv6-only → Dual-Stack CDN/Cache
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**Suboptimal!**

Dual-Stack User → ISP IPv6-only → Dual-Stack CDN/Cache

- CLAT 4->6
- PLAT 6->4

ISP IPv6-only
In Summary

**Optimal!**

- Dual-Stack User → ISP IPv6-only → Dual-Stack CDN/Cache

**Suboptimal!**

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**Optimal!**

- Dual-Stack User → ISP IPv6-only → Dual-Stack CDN/Cache

- CLAT 4→6
DNS/Routing-based Approach

• CLAT translate A records into AAAA:
  – WKP::A or NSP::A

• CDN/Cache provider configures dedicated interfaces to match WKP::A or NSP::A

www.example.com  A  192.0.2.1
CLAT translated to  64:ff9b::192.0.2.1
CDN IPv6 interface must be  64:ff9b::192.0.2.1
Operator must have a specific route to  64:ff9b::192.0.2.1

• Issues:
  – Only works if “local/private” connectivity
  – CDN/Cache provider needs to do “something”


CLAT/DNS-proxy-EAMT Approach

• CLAT detects queries only to A records while AAAA is also available (and do that query)
  – It is probably an IPv4-only device

• If response is not WKP/NSP, add to EAMT

```
www.example.com  A  192.0.2.1
                AAAA  2001:db8::a:b:c:d
```

EAMT entry

```
192.0.2.1 2001:db8::a:b:c:d
```

CLAT translated to

```
2001:db8::a:b:c:d
```

CDN IPv6 interface already is

```
2001:db8::a:b:c:d
```

Operator already has specific route to

```
2001:db8::a:b:c:d
```

• Issue:
  – Devices with ”manual” DNS will not take advantage
    • User don’t typically change DNS in STBs, SmartTVs (break other things)
    • Even do, no harm is caused
    • If user change CE DNS, still works!
    • If operator uses “DNS views” other things broken!
CLAT-provider-EAMT Approach

• Similar to previous one, but no "automated" EAMT
• Operator mush push or CE must pull the table
• It will work even if user change DNS for STB, SmartTV, …
• More control from the operator
  – EAMT pairs may be built “apart” from DNS
• Issues:
  – Increase complexity
    • Is the gains worth for it?
  – Need to add TTL (from DNS) to EAMT
Solution for IPv6-only Services?

NOT POSSIBLE! --- NO IPv4 connectivity

- Dual-Stack User
- ISP IPv6-only
- IPv6-only Service

- CLAT 4->6
- PLAT 6->4

Optimal!

- Dual-Stack User
- ISP IPv6-only
- IPv6-only Service

Add A RRs even if IPv4 is not available
Risks

• IPv4-only devices will not fallback (no HE)
  – A misconfigured CE is not acceptable
  – Even a small % may bring the Content Provider to disable IPv6

• So … failure cases need to be carefully considered
Conclusions

• CLAT/DNS-proxy-EAMT Approach seems the right approach.
• SIIT already has a SHOULD for EAMT support.
• 464XLAT maybe updated by this document so the CLAT has a MUST for EAMT support.
• Recommend having A “null” records for IPv6-only services in Internet?
  – Web page IPv4-only hosted by IETF showing “sorry this web page/service is only available from IPv6 enabled operators”
Next steps

• Co-authors:
  – Alejandro D’Egidio
  – Folks from CDNs

• Title change?

• Become a WG item?

• New inputs?