

Applications Test Results in MIF environment

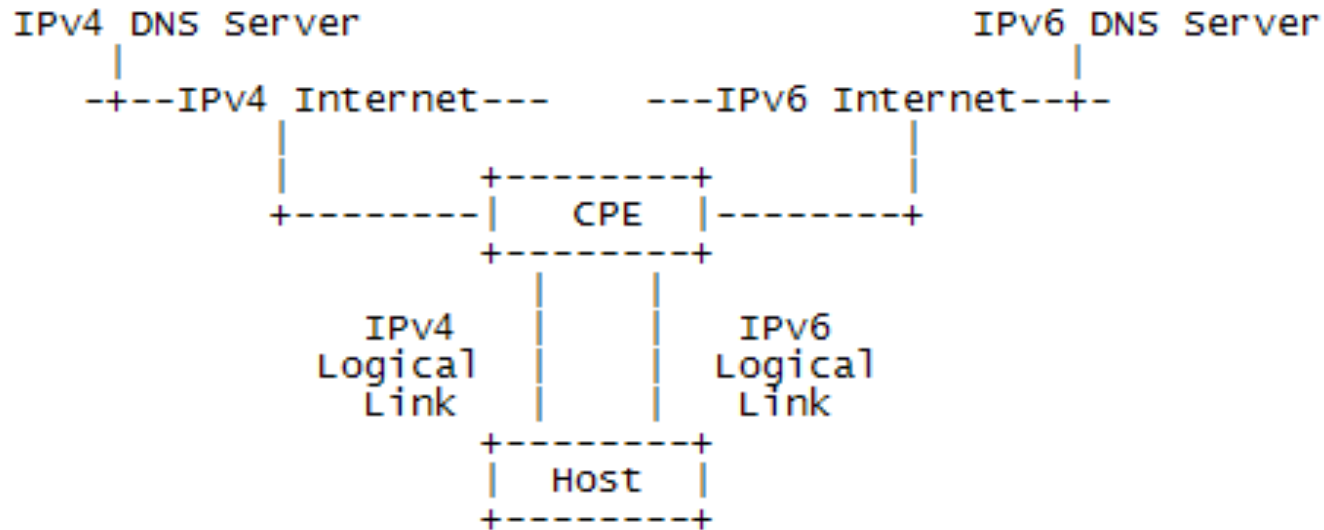
draft-zheng-mif-apps-test-02.txt

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Introduction

- Applications
 - Windows 7: ping, IE 9, Live Messenger 2009, Skype 5.1, Firefox 3.6, Google Earth 6
 - Fedora 13: ping and ping6, Skype 2.2, Firefox 3.6, Google Earth 6
- Scenarios
 - Host has one network adapter with dual stack
 - Host has two network adapters respectively with IPv6 and IPv4
- Transition solutions
 - AplusP [I-D.ymbk-aplusp]
 - DS-Lite [I-D.ietf-softwire-dual-stack-lite]
 - NAT64[RFC6145]/DNS64 [RFC 6147]
 - the combinations of them

Scenario 1: One network adapter with dual stack



- Test results on Windows
 - Ping, IE and Firefox: IPv6 has high priority if AAAA resource record is available;
 - Google Earth: IPv6;
 - Skype and Live Messenger: IPv4 (because AAAA resource record is unavailable)

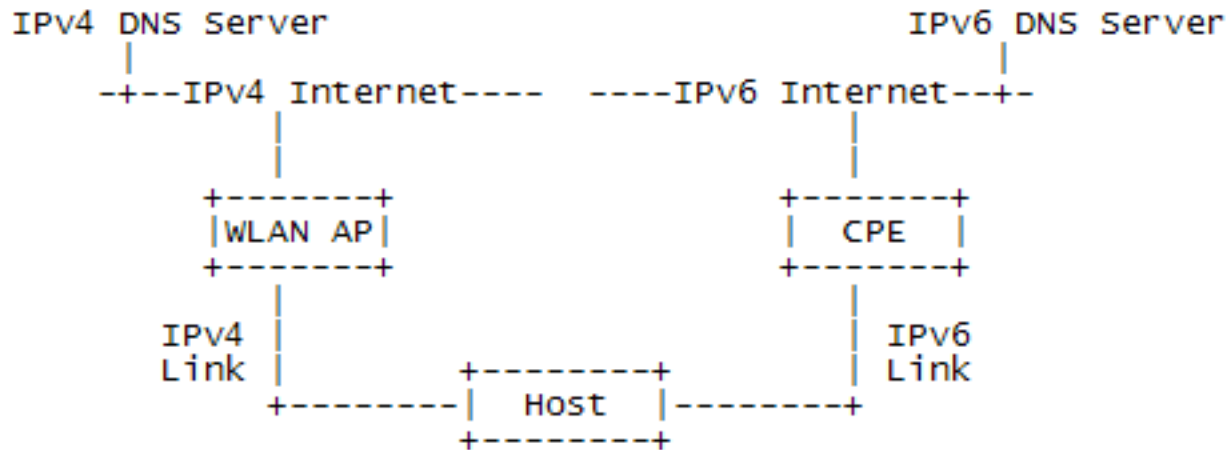
Scenario 1: One network adapter with dual stack

- Problems and suggestions on Windows 7
 - Windows 7 always first queries a host name's A record, and if it receives an NXDOMAIN it will not query for an AAAA record.
 - Windows 7 should ask for both type records in each DNS lookup or a host name that has only an AAAA record should have a CNAME which points to the AAAA.
- Test results on Fedora
 - The addresses of DNS Servers are configured in `/etc/resolv.conf`. The configured order decides which DNS Server has high priority. Analysis of how Fedora orders its DNS servers when it is DHCP-configured is for future study.

Scenario 1: One network adapter with dual stack

- IPv6 DNS Server has high priority
 - Ping, Skype: IPv4 (just sending A query);
 - Ping6, Google Earth: IPv6 (just sending AAAA query);
 - Firefox: IPv6 has high priority if AAAA resource record available;
- IPv4 DNS Server has high priority
 - Ping, Google Earth, Skype: IPv4 (just sending A query);
 - Ping6: IPv6
 - Firefox: IPv4, IPv6 only in the case: the AAAA record of the queried host name can be returned in the additional records section in the A query response
- Problems and suggestions on Fedora
 - The IPv6 DNS Server should be configured with high priority or the AAAA record of the queried host name can be returned in the additional records section in the A query response if IPv6 is wished for.

Scenario 2: Two network adapters respectively with IPv6 and IPv4 connections



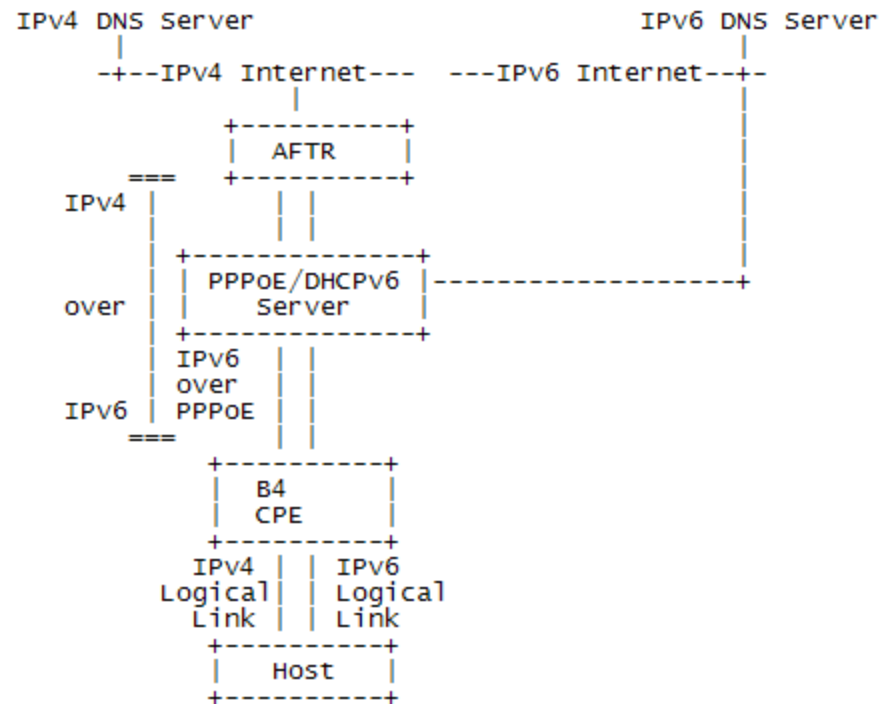
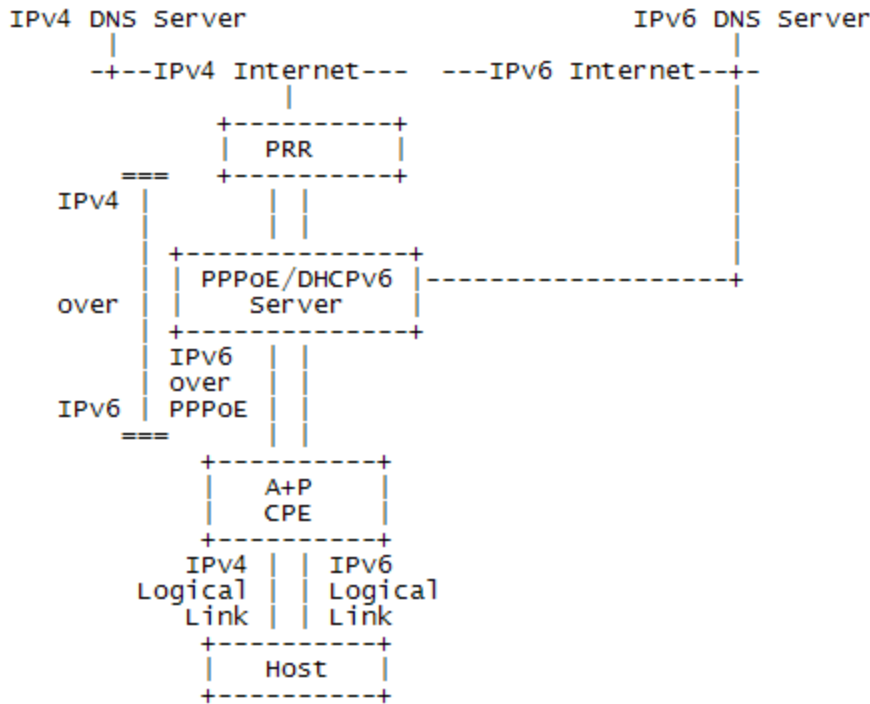
- Test results on Windows
 - The order of two adapters in which they can be accessed can be configured in Windows system. However, in our test, the order of adapters had no impact on the priority of DNS Servers.
 - Case 1: The two interfaces of IPv6 and IPv4 all with IPv6 and IPv4 dual protocol stacks
 - the results are same as in scenario 1

Scenario 2: Two network adapters respectively with IPv6 and IPv4 connections

- Case 2: IPv6 interface with IPv6-only protocol stack and IPv4 interface with IPv4-only protocol stack
 - Ping, IE and Firefox: IPv4 (most of websites), IPv6 only when the AAAA record of the queried host name can be returned in the additional records section in the A query response, such as www.kame.net;
 - Google Earth: IPv4 (because only A record is got from IPv4 DNS Server);
 - Skype and Live Messenger: IPv4 (because AAAA resource record is unavailable)
- Problems and suggestions on Windows
 - If IPv6 is wished for, the configuration of case 2 should be avoided.
- Test results on Fedora
 - same as in scenario 1

Transition solutions in MIF

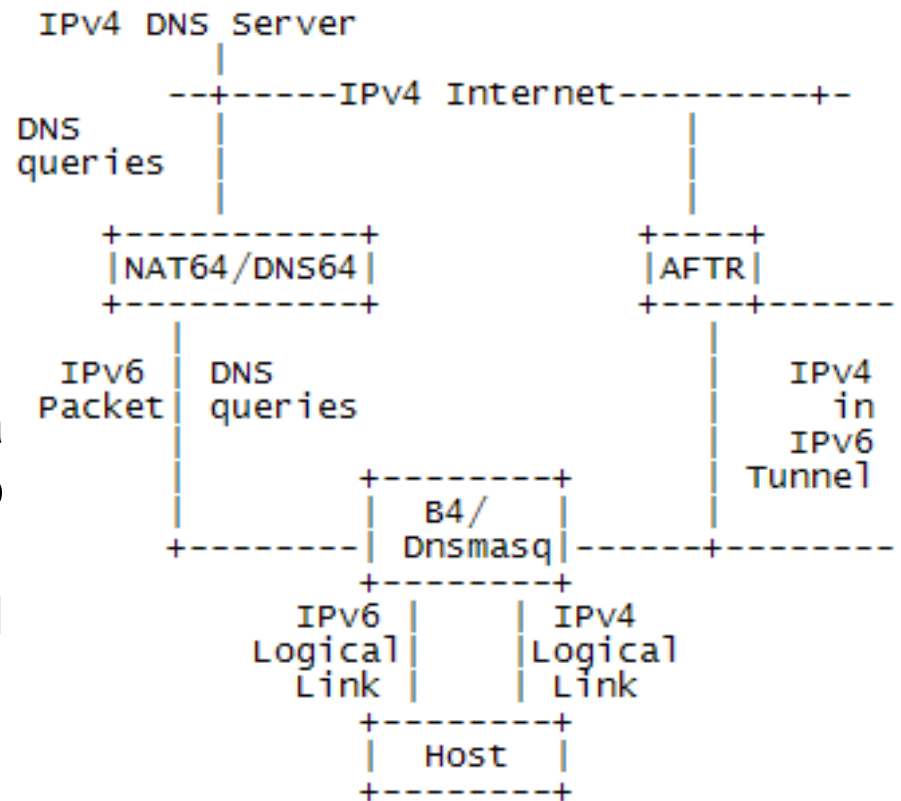
- Case 1: AplusP and IPv6 provisioned Host
- Case 2: DS-Lite and IPv6 provisioned Host



- Test results and suggestions
 - same as in scenario 1

Transition solutions in MIF

- Case 3: NAT64 and DS-Lite provisioned Host
 - Consider a host which contains both wifi and wireless interfaces.
 - When it connects a dual-stack network provided by a B4 element via wifi and also connects to an IPv6-only network via 3G/4G provided by a wireless ISP. The wireless IPv6-only networks has NAT64/DNS64 deployed.



Transition solutions in MIF

– NAT64 impacts on applications and suggestions

Application	NAT64
Firefox v3.6.12	works fine except watching video on line failed
IE v6.0	works fine except watching video on line failed
Google Earth v5.2.1	works fine
Skype v5.0	works fine
Live Messenger 2009	fails (see suggestions below)
uTorrent v2.2	fails (see suggestions below)
BitComet v1.23	fails (not IPv6 enabled)

- Live Messenger uses IPv6 to login to the server, but the IPv6 client did not send the same application layer message as the IPv4 client, so the IPv6 client (behind NAT64) failed to get reply from IPv4 server. Therefore, the application layer of Live Messenger should be IP version independent.
- There is a need for P2P applications behind NAT64 to learn the NAT64's prefix, so that IPv6 peer can talk with IPv4 peers via NAT64. Otherwise, IPv4 connectivity is required to support remaining access to IPv4 peer

Transition solutions in MIF

- Test in a both NAT64 and DS-Lite accessible network and suggestions

Application	Both NAT64&DS-Lite accessible
Firefox v3.6.12	video content via DS-Lite; other content via NAT64
IE v6.0	video content via DS-Lite; other content via NAT64
Google Earth v5.2.1	NAT64
Skype v5.0	NAT64
Live Messenger 2009	DS-Lite (see Section 4.7 for more information)
uTorrent v2.2	DS-Lite
BitComet v1.23	DS-Lite

Transition solutions in MIF

- Except BitComet, which although issues both A and AAAA queries, ignores AAAA RR and only uses IPv4 to initiate communication, all the other applications first try A RR to initiate IPv6 communications, and if it fails A RR is used to initiate IPv4 communications.
- Live messenger first fails IPv6 due to DNS64 translation, so it is suggested to avoid that translation when the application uses DNS64, as described in [I-D.wing-behave-dns64-config]. Yet, after failing IPv6 Live messenger automatically switches to IPv4 by which all the rest of communication were done.
- The application layer should be IP version agnostic in order to decrease impacts introduced by IPv6 transition solutions.

Thanks!